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PUBLIC HEALTH SERVICE

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Public Health Service Publication No. 81

Revised 1963

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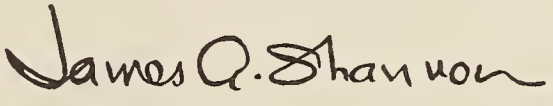
FOREWORD

The National Institutes of Health, a bureau of the Public Health Service, supports medical research, research training, and construction of research facilities in the Nation's medical and dental schools, universities, and other research centers. It also conducts laboratory and clinical research in its own facilities at Bethesda, Md., and in the field.

The programs of the nine Institutes are designed to obtain new medical scientific knowledge in order to control especially the major killing and crippling diseases of today, such as cancer, heart disease, arthritis, dental and neurological disorders, and mental illness. The role of medical science in promoting better health and longer life is well recognized by the American people. Through continued research leading to increased understanding of the causes, prevention, and treatment of disease, we can become a healthier and stronger Nation.

We at the National Institutes of Health appreciate our great responsibility. We approach our work with humility, but with confidence that we can aid materially in man's conquest of disease.



James A. Shannon, M.D.,
Director, National Institutes of Health.

1798

President John Adams signs bill establishing Marine Hospital Service for Merchant seamen.

1799

Amending Act extends benefits of Marine Hospital Service to officers and men of U.S. Navy.

1887

Research laboratory is founded at Marine Hospital, Staten Island, N.Y., to meet new responsibilities of Service.

1891

Hygienic Laboratory moves from Staten Island to Service headquarters, Washington, D.C.

1902

Marine Hospital Service name is changed to "Public Health and Marine Hospital Service." Biologics Control Division established in the Hygenic Laboratory and Advisory Board of "competent experts" is created to counsel with it.

1912

Name of Public Health and Marine Hospital Service is changed to "Public Health Service."

1930

Hygienic Laboratory becomes National Institute of Health; Advisory Board of Biologics Control Division becomes National Advisory Council.

1937

Congress authorizes National Cancer Institute.

1938

National Institute of Health moves to land donated by Mr. and Mrs. Luke I. Wilson at Bethesda, Md.

1947

Division of Research Grants established to process NIH grants and fellowships to non-Federal institutions and scientists.

1948

National Heart Institute authorized; other laboratories regrouped to form Microbiological Institute, Experimental Biology and Medicine Institute, and National Institute of Dental Research. NIH becomes National *Institutes* of Health.

1949

Mental hygiene program of Public Health Service transferred to NIH and expanded to become National Institute of Mental Health.

1950

National Institute of Neurological Diseases and Blindness and National Institute of Arthritis and Metabolic Diseases established, the latter absorbing Experimental Biology and Medicine Institute.

1953

Public Health Service becomes a constituent of newly created Department of Health, Education, and Welfare; Clinical Center opens.

1955

Three Divisions formed—Biologics Standards, Research Services, and Business Operations. National Microbiological Institute becomes National Institute of Allergy and Infectious Diseases.

1958

Division of General Medical Sciences created.

1959

Office of Administrative Management formed, consolidating the Division of Business Operations and other managerial responsibilities.

1962

Division of Research Facilities and Resources created; National Institute of Child Health and Human Development established; Division of General Medical Sciences becomes National Institute of General Medical Sciences.

Directors of the National Institutes of Health

John F. Anderson, M.D.
1909 – 1915

Joseph J. Kinyoun, M.D.
1887 – 1899

Milton J. Rosenau, M.D.
1899 – 1909

George W. McCoy, M.D.
1915 – 1937

Lewis R. Thompson, M.D.
1937 – 1942

Rolla E. Dyer, M.D.
1942 – 1950

James A. Shannon, M.D.
1955 – —

William J. Sebrell, M.D.
1950 – 1955

Growth and Progress

AT THE BEGINNING of this century, the average newborn child in the United States could be expected to live only 47 years. Today the average life span is 70 years. One of the reasons for this gain has been the progress of medical science, particularly against the infectious diseases.

Among agencies contributing to this progress has been the Public Health Service. Since its creation by Congress in 1798, this organization—first named the Marine Hospital Service—has shouldered a steadily increasing responsibility. Today its various services and facilities, such as those of the National Institutes of Health, form an important part of the Nation's public health resources.

The Service has conducted medical research since 1887, when a laboratory of bacteriology was established on Staten Island, N.Y. This was in response to the urgent need to guard against epidemics that might arise from persons entering the country. Dr. Joseph J. Kinyoun, director of the new laboratory, was the first to detect the cholera organism among immigrants to America.

The leading causes of death at that time were infectious diseases—pneumonia and influenza, tuberculosis, intestinal disorders. But those were also the days of Pasteur, Koch, and Ehrlich. They were days of discoveries that offered not only effective health weapons, such as diphtheria antitoxin, but also basic principles that launched an era of great progress in medical science.

The Public Health Service's laboratories, now centered largely in the National Institutes of Health at Bethesda, Md., have made many research discoveries of importance in the prevention and treatment of diseases and other disabling conditions. Illustrative discoveries are: recognition that pellagra results from a dietary deficiency; development of a vaccine and serum against Rocky Mountain spotted fever; demonstration that one type of cancer (choriocarcinoma) can be suppressed by chemotherapy; development of a technique for detecting abnormal openings between the left and right chambers of the heart; and the discovery of several diseases—ariboflavinosis, Louisiana pneumonitis, rickettsialpox. Most recent discoveries are: the discovery, test and treatment for the exact chemical cause of galactosemia; a practical and accurate diagnostic test for phenylketonuria; conclusive identification of the enzymatic block in histidinemia; proof that malaria can be transmitted from monkey to man; and an effective emergency treatment for burn shock so simple it can be made in any kitchen.

In 1962, NIH scientists succeeded in partially cracking the so-called genetic code which lies at the heart of the systematic reproduction of all living matter, and unraveled the first clue as to how genetic information is transmitted. Their work is of major importance because a full understanding of genetics is one of the most important basic problems in biology. This new knowledge of ribonucleic acid brings science closer to understanding the basis of life itself.

Research in metabolism, though often applied to a specific health problem, is gradually building toward an overall view of body chemistry. For example, much progress has been made in mapping the numerous steps by which sugar in the body is converted to a usable form and finally burned to yield energy. Then, the means by which energy is harnessed are also being investigated. Such mechanisms involve vitamins, minerals, enzymes, and other substances. Intricate indeed is the jigsaw puzzle of metabolism, normal and abnormal; and a complete solution, certainly far in the future, would leave few mysteries of disease.

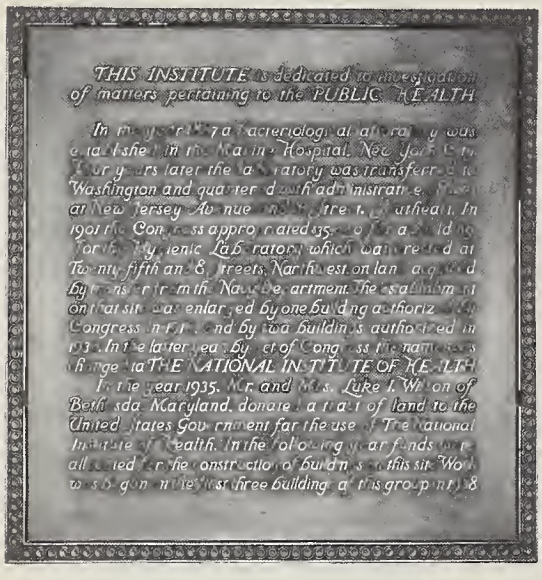
Biophysics, the science of matter and motion as related to life, is another expanding discipline that serves many fields. Again, new equipment and techniques have played a major part. For example, the electron

microscope, about 100 times as powerful as earlier instruments, has extended the visualization of tissues to their smallest units, the molecules themselves. The ultracentrifuge, a high-speed whirling device, separates the particles composing cells. Other instruments that have opened new approaches are generators of subatomic particles in the multimillion-volt range, and brain-scanning equipment which permits detection and precise location of brain tumors without opening the skull.

Before World War II, major trends were apparent in the Nation's health. Sanitation, better nutrition, improved medical treatment had all contributed to longer life; and more people were subject to the ills of an aging population—the so-called chronic diseases. Their control would require new knowledge, new basic principles that only research could provide.

Accordingly, Congress authorized in 1937 the National Cancer Institute, dedicated to research against the disease that had risen from eighth to second place as a cause of death in this country. By 1950, the scope of investigation had been extended to include six additional research Institutes at Bethesda, some incorporating older laboratories, each to work in a problem area such as heart diseases or mental illness.

The most recent additions to NIH are two Institutes and a Division authorized in 1962. The National Institute of General Medical Sciences is the successor to the Division of General Medical Sciences, established four years earlier in answer to a need for basic research in the fundamentals of life and health. The National Institute of Child Health and Human Development provides a central focus and coordinating point for research and training activities in those two vital areas. The Division of Research Facilities and Resources formulates plans, policies, and procedures for the grant programs of NIH which provide resources and facilities for the over-all program of institutions conducting research in the health-related sciences.



Historical Note

Commemorating the dedication of the National Institutes of Health administration building is the following historical statement, inscribed on a bronze plaque just inside the main entrance:

This institute is dedicated to investigation of matters pertaining to the public health.

In the year 1887 a bacteriological laboratory was established in the Marine Hospital, New York City. Four years later the laboratory was transferred to Washington and quartered with administrative offices at New Jersey Avenue and B Street SE. In 1901 the Congress appropriated $35,000 for a building for the Hygienic Laboratory, which was erected at 25th and E Streets NW., on land acquired by transfer from the Navy Department. The establishment on that site was enlarged by one building authorized by Congress in 1918, and by two buildings authorized in 1930. In the latter year, by act of Congress, the name was changed to "The National Institute of Health." [1]

In the year 1935, Mr. and Mrs. Luke I. Wilson of Bethesda, Md., donated a tract of land to the U.S. Government for the use of The National Institute of Health. In the following year funds were allocated for the construction of buildings on this site. Work was begun on the first three buildings of this group in 1938.

[1] In 1948 the name National *Institutes* of Health was made official by another act of Congress.

National Institutes of Health Today

Since World War II, the National Institutes of Health has been part of a national trend toward more emphasis on research and development in all fields.

Throughout this period of growth, research in the life sciences has maintained pace and continues to account for about 4 percent of the total.

A breakdown of the sources of support of medical and related research shows—as is true with all research and development in the United States—that Federal programs have contributed the major share in supporting this expansion. Of the estimated billion dollars spent on medical research during fiscal year 1962, the Federal Government contributed 57 percent. Today, 10 Federal agencies conduct or support medical research or fundamental research related to medicine. The major ones are: Department of Health, Education, and Welfare; Department of Defense; Atomic Energy Commission; Veterans Administration; National Science Foundation; Department of Agriculture; and the National Aeronautics and Space Administration.

The Department of Health, Education, and Welfare is responsible for about four-fifths of the Federal expenditure for medical research. About 85 percent of the Department's appropriations for medical research are invested in Public Health Service programs conducted and administered by the National Institutes of Health.

A predominant part (in fiscal year 1962 about 80 percent) of the public funds appropriated for NIH is in turn awarded to non-Federal institutions such as medical schools and colleges, universities, hospitals and scientific institutions for the support of research studies, research training, and the construction and equipping of new and modernized research facilities. This is often referred to as the extramural program.

Research project grants constitute the largest part of the extramural program. The purpose of these grants is to stimulate research in medical and allied fields by making available funds for such research and by actively encouraging scientific investigation of specific problems on which scientists agree that urgently needed knowledge is lacking. Since its inception in 1946, the research grants program has operated under a basic tenet that the integrity and independence of the research worker and his freedom from control, direction, regimentation, and outside interference are paramount. Initially, it was possible to provide support to investigators on a year-to-year basis only. Through the years, however, the promised period of support given to investigators starting a new project has increased gradually to an average of more than 3 years. Thus, the recipient of a new grant today has greater assurance of stability in planning a program of research. In fiscal year 1962, a total of 14,882 of these grants were awarded to scientists in 1,198 non-Federal institutions.

Although the research projects supported by NIH-administered grants provide secondary training benefits in a research atmosphere, the support of research training and related activities is a distinct and separate part of the extramural program. These efforts do not constitute the primary source of funds for the training of doctors, dentists, nurses, and medical scientists, but rather serve to supplement the sums provided by State and local governments, by private philanthropy, and by the families and friends of the students themselves. There are three basic types of

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support for the training of research personnel: (1) Research Fellowships; (2) Research Career Awards; and, (3) Traineeships and Training Grants. There were about 8,000 such awards made in fiscal year 1962.

Fellowships provide personal support, and in some instances provide for certain additional costs, for persons engaged in research training at one level or another.

Training grants are mainly for the purpose of assisting institutions to establish, expand, or improve their research and special training programs and to increase the number and improve the caliber of trained personnel in fields of major interest to the various Institutes.

Traineeships provide stipends in order that individuals may undergo training in specialized areas of medical and related research and technology, including the fields of public health and nursing.

Another major activity of the extramural program provides grants on a matching basis to public and private nonprofit institutions to assist in the construction of additional facilities for the conduct of research in the sciences relating to health. In the 6 years following passage of the Health Research Facilities Act of 1956, 355 grants totaling more than $208 million have been made to 976 institutions in almost every State in the Union. During fiscal year 1962 more than $31 million was awarded in 97 grants to 80 institutions.

To assure that the direction and method of operation of the grants and awards programs are in the national interest, NIH relies on advisory and consultative groups to the Public Health Service. These groups, consisting of some of the Nation's leading scientists and informed, public-spirited citizens, provide study and advice which is an inherent part of the philosophy that NIH grants and awards programs are of and for the scientific community and in behalf of the people of the United States.

For example, the Study Sections—which numbered 45 in 1962—are composed of specialists who represent the disciplines that comprise modern medical science. These Sections, composed of non-Federal specialists, screen each grant application to ascertain the qualifications and competence of the investigators, adequacy of the research findings, significance of the proposed study, and the relative importance of particular areas of research.

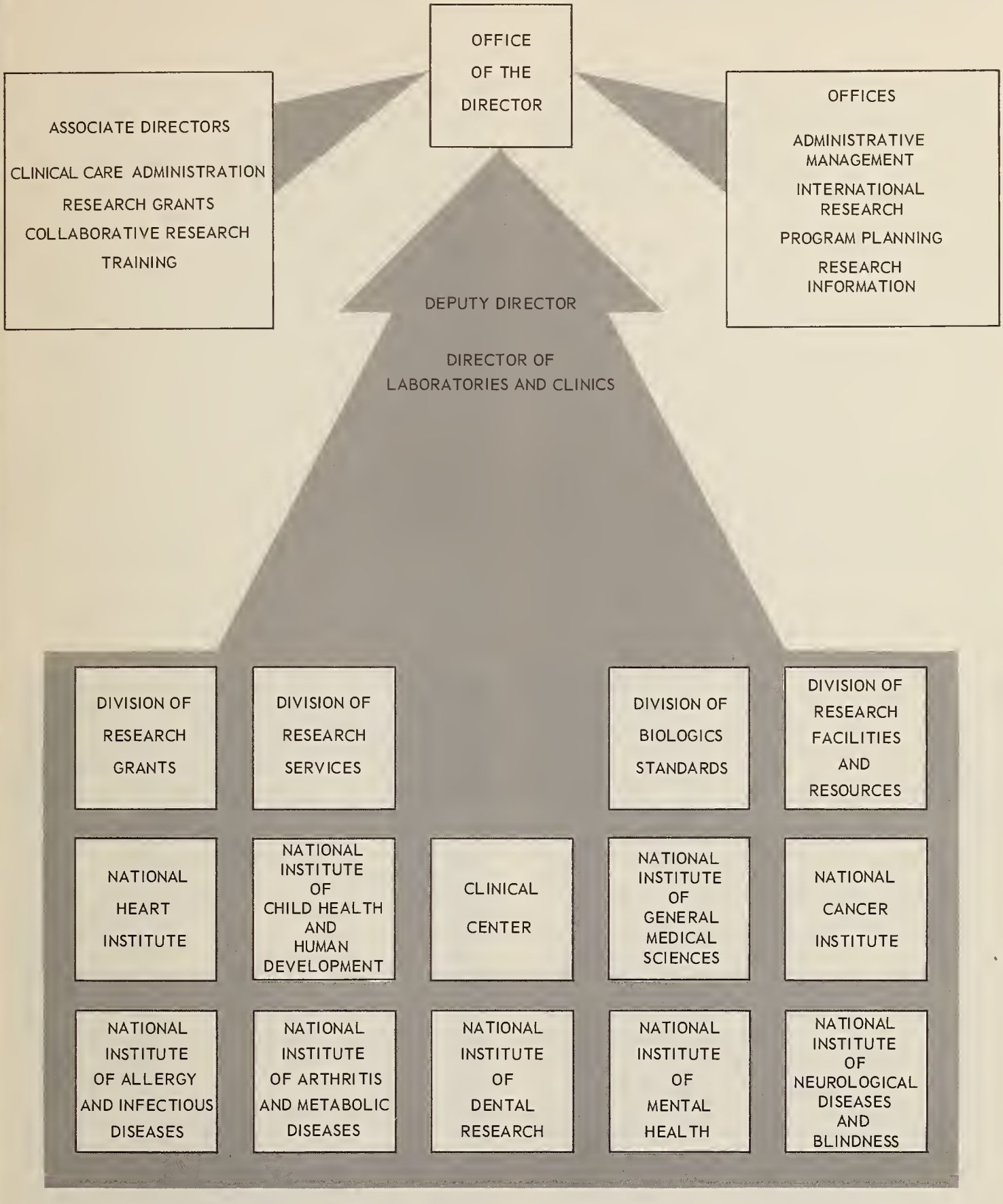
Each Study Section reaches its decisions objectively and submits its professional recommendations to a second group of advisory bodies—the National Advisory Councils. Statutory rather than administratively established, the Councils are composed of leading lay citizens as well as non-Federal scientists. There are nine Advisory Councils: one for each of the seven categorical Institutes at NIH, the Health Research Facilities Advisory Council, and the National Advisory Health Council, which serves both for the National Institute of General Medical Sciences and the broad aspects of public health research. The Surgeon General of the Public Health Service may not approve a grant application that has not been recommended by an Advisory Council.

A third type of advisory body was created at NIH in 1957. These groups, called Boards of Scientific Counselors and composed of six non-Federal scientists, advise each of the Institutes and the Division of Biologics Standards on the scientific activities conducted directly in the clinical and laboratory facilities of NIH.

At Bethesda and in its field facilities, the NIH staff numbers about 10,000 full-time workers, including about 1,500 with doctoral degrees. Of these, about half are M.D.'s, and most of the remainder are Ph.D.'s. In addition, nearly 10 percent of the physicians at NIH also have a Ph.D. or other doctorate. The scientific staff also includes dentists, veterinarians, and doctors in other sciences. In its own laboratories, the National Institutes of Health conducts more than 1,400 research projects. They cover many areas that can be specifically identified with the diseases for which the Institutes were named, but a substantial number of studies deal with fundamental body processes essential to basic understanding of disease and health.

Top program direction and coordination are provided by the Director of NIH, his professional staff associates for guidance of the intramural and extramural programs, and staff aides for administration, international research, program planning, and research information. The Office of the Director works with the Institute Directors, Scientific Directors, and others in the Institutes and Divisions to coordinate and evaluate the research and support programs.

In summary, then, the National Institutes of Health serves primarily as a focal point for the national support of health research and secondarily as an institution which, in itself, conducts a wide variety of laboratory and clinical research aimed at discovering new knowledge about the prevention, diagnosis, and treatment of disease and disability.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CLINICAL CENTER
NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES
NATIONAL CANCER INSTITUTE
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES
NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES
NATIONAL INSTITUTE OF DENTAL RESEARCH
NATIONAL INSTITUTE OF MENTAL HEALTH
NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND BLINDNESS

National Cancer Institute

Every year, more than 800,000 people in the United States are treated for cancer, and more than 500,000 of these cases are newly diagnosed. Approximately 250,000 cancer deaths occur annually. At prevailing rates, 16 in every 100 people born are destined to die of some form of the disease.

The various forms of cancer are disorders in which cells grow and spread abnormally. Once cells have become cancerous, they retain their new form and reproduce rapidly. They take food needed by normal cells, invade healthy tissues, and spread from their original site to other parts of the body. There are scores of different forms of cancer, and it seems likely that many factors play a role in causing each one. As a result, the effort to bring cancer under control is confronted by many problems.

The National Cancer Institute, oldest and largest of the nine institutes and four divisions that make up the National Institutes of Health, is a leader in the world-wide effort to solve these problems through research on the nature and causes, detection and diagnosis, and treatment of cancer.

Established by an act of Congress in 1937, the Institute has a staff of approximately 600 scientists, technicians, and laboratory assistants carrying on basic research in biology, biochemistry, viral oncology, pathology, pharmacology, physiology, and clinical investigations in endocrinology, medicine, surgery, radiology, and dermatology. The Institute has laboratories in several buildings on the National Institutes of Health grounds and both laboratory space and hospital beds in the Clinical Center for coordinated research and treatment.

Through grants and awards to investigators at other institutions in this country and abroad, the Institute supports additional research on virtually every aspect of cancer and provides resources to help meet the urgent need for increasing numbers of trained scientists in cancer research, to alert physicians to advances in diagnosis and treatment, and to furnish career opportunities for men and women interested in teaching and cancer research. These programs of support for research and training take more than half of the funds Congress appropriates each year for the Institute.

A major segment of current cancer investigations is devoted to research on chemotherapy, or drug treatment, one of the most promising approaches to finding improved ways of treating cancer patients. Surgery and radiation therapy are now the only means of curing most forms of cancer, but drug treatment offers the greatest hope for dealing effectively with generalized cancers, such as leukemia, or cancers that have spread beyond their original site.

Since 1955, the Institute has been administering a nationwide cooperative program aimed at finding and bringing into use new and more effective drugs than are now available. For this purpose, thousands of compounds are screened every year, and, after additional testing, the most promising ones are carefully evaluated in clinical trials in hospitals across the country.

Institute scientists are also active in chemotherapy research, and much of their work in integrated with the national program. A large share of their effort is directed toward drug treatment of patients with leukemias and lymphomas, such as Hodgkin's disease, and toward development of improved methods of supportive therapy, particularly for leukemia patients, who are in constant danger of hemorrhage and infection.

Tests in animals are an essential step in cancer drug research.

The success achieved in saving the lives of some cancer patients by drug treatment alone is especially notable, for it is unprecedented in cancer chemotherapy. A few women treated at the Institute for a form of cancer that develops in the womb after pregnancy have remained free of the disease for more than 5 years.

In research on the causes of cancer, studies of the role of viruses are becoming increasingly important. Viruses are known to cause cancer in many animal species, and there is a strong possibility that they may be responsible for certain forms of human cancer as well. If this proves true, it may be possible to devise ways of preventing cancer by using vaccines or by chemically modifying the effects of viruses.

To aid in establishing a causal relationship between viruses and cancer in man, scientists everywhere are trying, through work with animal virus-tumor systems, to develop techniques that can be utilized for direct studies of the human problem. In recent years, the Institute has expanded its own virus-cancer research and greatly increased its support for similar studies at other institutions. It also supports a program for the development of tools and services needed by virus-cancer investigators.

Also of growing importance are studies of possible environmental causes of cancer. This is one of the oldest areas of cancer research, for the influence of excessive exposure to sunlight, X-rays, radium, and certain coal tar products was recognized long ago. The objective of current research is to assess the potential hazards of the modern world's increasing air and water pollution, use of radioactive materials in industry, radioactive fallout from bomb tests, and addition of various chemicals to food. This work, too, has many potential implications for cancer prevention.

Additional knowledge that may be of value in establishing the causes of cancer and learning how to prevent it may come from statistical studies of variations in the occurrence of many forms of the disease in relation to race, age, sex, marital status, living habits, occupations, and place of residence. The Institute conducts and supports many environmental as well as statistical studies.

Staff scientists, as well as the Institute's hundreds of grantees, are also carrying on basic studies in many other research categories, such as the effects of radiation on normal tissue and cancer, the relationship of genetic constitution to the occurrence of various types of cancer, the use of animal tumor systems to predict the probable effects of drugs on human cancer, the role of chemicals in causing cancer, the influence of surgery on the dissemination of cancer cells, and the development of techniques for measuring the effects of cancer and anticancer treatment on the patient.

Because cancer is most effectively treated in its early stages but often gives no recognizable signal of its presence until it is far advanced, the Institute is conducting and supporting studies of biochemical, biophysical, and cytological techniques for detecting early cancer.

In an effort to reduce the lag between discovery of new methods of controlling or preventing cancer and application of the methods by physicians and health agencies, the Public Health Service has established a Cancer Control Program, which receives technical advice and guidance from the Director of the Cancer Institute.

One of the vital tools in the Cancer Control Program is the cell examination test for detection of early uterine cancer. Accordingly, support for case-finding projects using this technique receives major emphasis, and grants are made to State and local health departments for professional and public education, home nursing, and hospital cancer registries.

An electron microscope is a valuable aid in virus-cancer studies.

National Heart Institute

Diseases of the heart and blood vessels cause over half the deaths in the United States, almost 1 million each year. Heart diseases claim many victims prematurely, in their most productive years. About 10 million Americans have cardiovascular ills.

To help combat this serious national problem, Congress in 1948 established the National Heart Institute. The Institute's intramural research program is directed primarily toward the acquisition of basic knowledge about the structure of the body and its functions. This offers the most promising approach for understanding the underlying causes of disease and for eventual means of prevention and cure.

At the same time—thanks to the excellent patient-care facilities provided by the NIH Clinical Center—the Heart Institute also conducts a vigorous research program aimed more directly at the solution of specific clinical problems posed by heart disease.

Here is a brief view of a few major areas of activity in the National Heart Institute:

Investigators in cellular physiology and metabolism are attempting to translate to a cellular or organ level the advances made in the general field of enzyme chemistry and biophysics. They are studying the way body cells use the chemical energy found in food for such processes as muscular contraction. The same laboratory is also studying the factors implicated in the development of atherosclerosis, the major form of hardening of the arteries.

The Institute's Chemical Pharmacology Laboratory seeks to acquire enough basic knowledge about the chemical structure of drugs to be able to predict what their effects will be in the human body. Such studies will provide pharmacologists with the facts they need to design drugs for the specific treatment of individual patients.

Institute research in clinical biochemistry is concerned with the mechanisms of metabolism and with disease-induced alterations in these mechanisms. A major area of study is the metabolism of amines. Since many drugs currently used against hypertension affect amine storage, synthesis, or destruction, scientists frequently employ drugs as research probes in the study of amine metabolism.

Research on the physiology of the kidney and on the mechanisms by which it maintains fluid balance, acid-base balance, and electrolyte balance in the body is a prime concern of NHI scientists. Other important studies are centered on the roles played by hormones from the pituitary, adrenal, and other endocrine glands as regulators and modulators of these processes.

The gas chromatograph has become a most important analytical tool for heart researchers who study the role of fats in heart disease.

In clinical endocrinology, scientists are conducting studies on the basic physiology of the adrenal cortex and parathyroid glands. Particular emphasis is given to research on the synthesis, release, and metabolism of aldosterone and on the role of parathyroid hormone in calcium and phosphorous metabolism.

The research of investigators concerned with cardiovascular physiology is aimed at understanding the numerous regulatory mechanisms that adjust heart performance to conform with the circulatory requirements of the body's organs and tissues. Scientists are giving special attention to the nerve and hormonal pathways which can affect heart work and output.

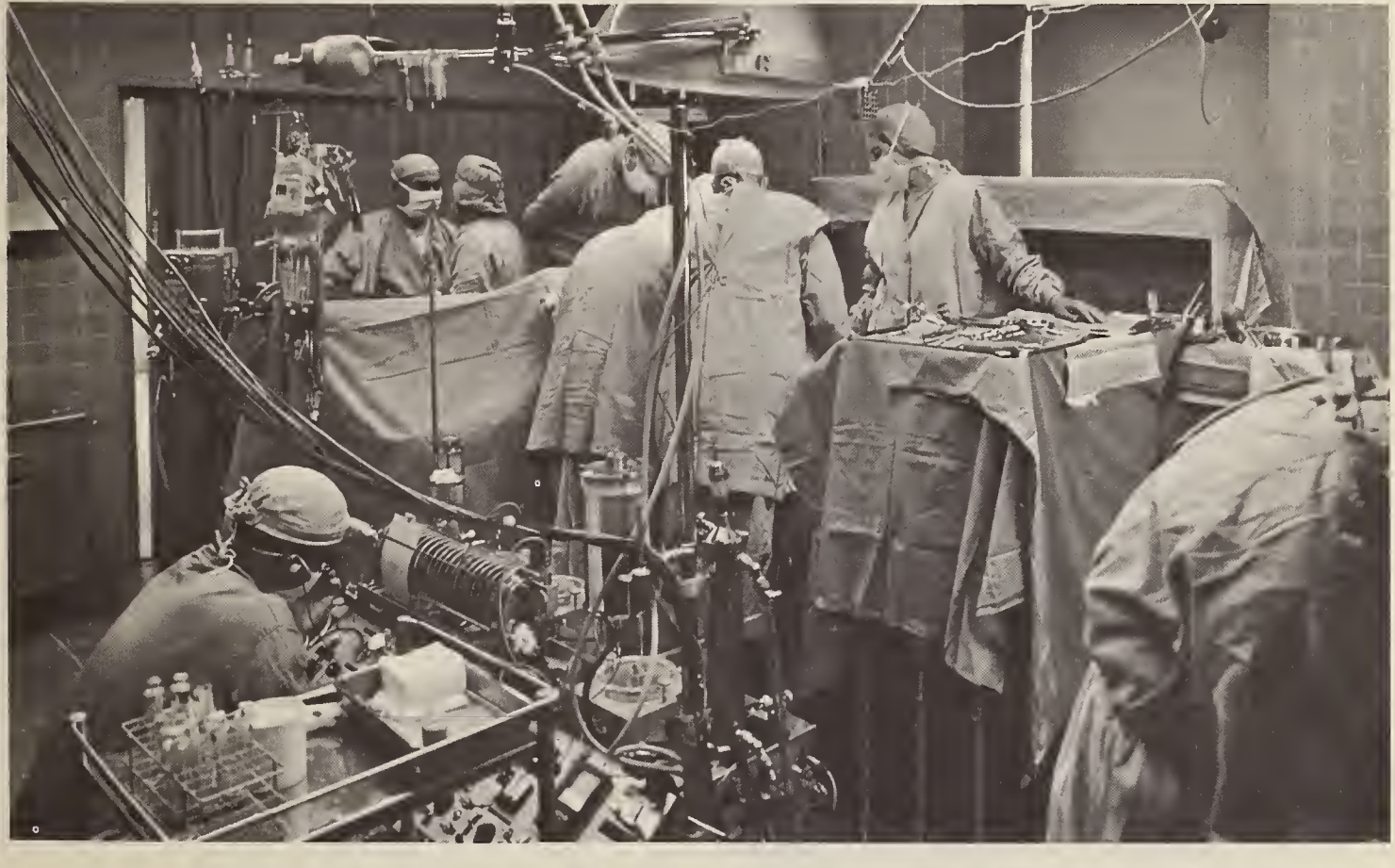
Heart Institute surgeons are constantly exploring new methods for the surgical treatment of patients with congenital or acquired heart disease. They test new techniques in laboratory animals. Those that prove worthy are given clinical trials in patients. For instance, much progress has been made in the design and installation of artificial valves for the partial or complete replacement of heart valves too severely damaged for restoration by surgery.

The research program in gerontology seeks knowledge about the biochemical, physiological, and psychological changes that occur with increasing age in man. Researchers study the effects of aging in the whole organism, in individual organs and tissues, and in individual cells and components.

In addition to its laboratory and clinical research at Bethesda, the Institute is conducting epidemiological studies, such as a long-term community project at Framingham, Mass., to determine those characteristics which are present in people who develop heart disease. Other Institute functions include biometrics research and the dissemination of public and professional information. Also, the Institute—in cooperation with the Bureau of State Services of the Public Health Service—provides support to the States in developing community heart disease control programs.

No single research facility, of course, could meet the problem of the conquest of heart disease. Heart research is carried on in hundreds of hospitals, universities, and other institutions all over the United States. In these research centers the Heart Institute supports more than 2,000 scientific projects through research grants. Support is also awarded to medical schools and other institutions and individuals to strengthen cardiovascular teaching, to encourage heart research careers, and to increase and improve training in fields important to progress against heart disease. Altogether, these extramural programs account each year for over three quarters of the annual appropriations to the National Heart Institute.

Today there is more to be learned than to be taught about diseases of the heart and circulation. So, research is the great bulk of the National Heart Institute program. Yet in every part of this program, research, education, and control activities are intertwined . . . knowledge is sought, knowledge is shared, and people are helped.



In this NIH Clinical Center operating room, heart surgeons correct acquired and congenital heart defects. The technician seated in the left foreground operates the heart-lung machine.

National Institute of Allergy and Infectious Diseases

Research on infectious diseases, largely centered in the National Institute of Allergy and Infectious diseases, is the oldest activity of the National Institutes of Health. Notable advances have been made against many serious infectious diseases, especially through development of new vaccines and of antibiotics effective against major bacterial illnesses, but critical problems remain unsolved. For example, no drug has been found that is generally useful against viruses.

The National Institute of Allergy and Infectious Diseases is concerned with a formidable array of the afflictions of mankind, such as measles, asthma and hay fever, hepatitis, viral encephalitis, smallpox, streptococcal and staphylococcal infections, tuberculosis, poliomyelitis, rabies and others.

In its laboratories and clinical research facilities at Bethesda and at strategically located field stations in Montana, South Carolina, Hawaii, the Panama Canal Zone and smaller units elsewhere, the Institute conducts some 200 research projects; through the research grants program, it supports about 2,000 additional studies mainly in non-Federal laboratories and medical centers throughout the United States and in some foreign facilities. Collaborative work is also conducted with other Government research groups and (also) with industrial specialists.

Food is autoclaved for sterility before being introduced into the tanks in which animals are maintained in a germfree state.

Against bacterial infections, for example, the Institute and its grantees are constantly at work trying to develop new antibiotics, or new forms of these useful biologics, in order to maintain our lead against microbes that have capacity to change their defenses all too soon after we change our mode of attack. The allergic diseases, too, present a great challenge to medical science. These prevalent and little-understood disorders are being studied especially from the standpoint of the basic immunologic processes which involve allergy and many other disease manifestations, also. Viral disease is another vital interest of the Institute, whose scientists continue to make major contributions to our understanding of viral illness, especially the host of respiratory infections and their serious complications. The comparison has been made that virology stands today where bacteriology stood in the early 1900's, holding great promise for the alleviation of many ills. Still another strong interest is the parasitic diseases, including many of the so-called tropical diseases that exact immense tribute of world health and world economy. Malaria, for example, afflicts about 200 million people and kills 2 million annually, representing a constant threat to every world traveler and a hidden cost in international trade.

The success of medical science thus far in freeing the people of the United States from many infectious diseases has enabled this Nation to become a world leader against these afflictions. At the same time, we have been able to focus more attention on the so-called chronic diseases about which you will read more later in this brochure.

Scientists and physicians also have become aware of relationships of infections to chronic disorders. For example, streptococci are involved in rheumatic heart damage. Viruses are known to cause certain

types of cancer in animals, leading to a search for possible human cancer viruses. Future progress against many chronic diseases may arisc from more effective control of infections in the earliest years.

In respiratory virus research, Institute scientists and grantees have been leaders in the ficld. They have discovered and defined many of the new viruses now related to severe respiratory illnesscs in children—the pneumonias that are a leading cause of death in infants. Adenoviruses, parainfluenza and respiratory syncytial viruses and the "Eaton agent"—a pleuropneumonia-like organism—are now implicated in a major proportion of these illnesses.

Two national programs have recently been initiated by the Institute: the Vaccine Dcvelopment Program and the Viral Reference Reagent Program. The former is administered with the advice of a board composed of members from active research groups in universities and in government. The objective is to develop vaccines effective against some of the newly recognized respiratory diseases often grouped by laymen under the term "common cold." The second major program designed to provide standardized and comparable viral reference reagents—that is, the substances that react with a virus to identify it—will at first make these materials available to Institute scientists and grantees. A beginning has been made to provide reagents against numerous different types of adenoviruses.

The biochemical and biophysical structure of viruses, themselves, also is being investigated by the Institute, as well as the structure of other microbes and of cells. The vectors or carriers of disease organisms also are studied intensively in the hope of finding a "weak link" in metabolism or life cycle.

Modern technics are being used in the study of immunologic aspects of such diseases as lupus erythematosus, nephritis, chronic thyroiditis and others in which an auto-immune basis is suspected—that is, the immune response of an individual hypersensitive to materials present within his own body.

One of the historic components of the Institute is the Rocky Mountain Laboratory, created in 1921 to study Rocky Mountain spotted fever, against which Institute scientists some years later successfully produced a vaccine. This laboratory at Hamilton, Mont., has become a world center for the study and control of diseases in nature transmitted to man.

The Institute also supports a laboratory, the Middle American Research Unit, and inter-related facilities at Bethesda, concerned primarily with tropical virology, especially viral infections transmitted by mosquitoes, mites and other arthropods. Outbreaks of virus encephalitis in the United States are comparable.

Since the first admission of patients in 1953, Institute clinicians have accumulated an impressive and in many cases unique series of cases of hypogammaglobulinemia (failure to produce sufficient antibodies against infection), cystic fibrosis, disseminated lupus erythematosis and systemic fungal disease. Most recently a program to study acute respiratory illnesses in adult patients is providing new information about human response to these infections. Special clinic-laboratory facilities have made it possible to test several new drugs that show promise against bacterial and fungal diseases resistant to known treatments.

In addition to the research projects conducted or supported by the Institute, new types of support include Program-Project Grants which are made to institutions for studies of multiple problems within a broad research category. Typically, these grants involve the organized efforts of large groups and a long-term program of research activities. Another type of new support is the Research Center Grant awarded to institutions solely for support of basic physical resources and services essential to research studies which are usually clinically oriented.

Technician examines an immunological pattern. Each line identifies one of the proteins found in human serum.

National Institute of Arthritis and Metabolic Diseases

Most people will either develop some form of arthritis during their lifetime or know someone who does. This disease, which is probably responsible for more crippling and discomfort than any of the other ills of man, is one of the major research interests of the National Institute of Arthritis and Metabolic Diseases. Here, as in other research centers throughout the country, the intensive studies now undertaken on arthritis and other rheumatic diseases are in sharp contrast to those of a comparatively few short years ago when relatively little research was being done.

Although originally established for the study of the arthritic disorders and metabolic diseases, the Institute has continued to expand its activities into other major research areas. These now include diseases of the gastrointestinal tract such as peptic ulcers, many hereditary disorders, and diseases of blood and bone. Underlying these clinical and laboratory studies in medicine is extensive fundamental research in biochemistry, enzymology, physical biology, and nutrition.

Congress created the Arthritis and Metabolic Diseases Institute in 1950, following a surge of interest in the arthritic disorders, spurred in part by the discovery that the then recently synthesized adrenal hormone, cortisone, could bring dramatic relief to many victims of arthritis. It was soon found, however, that along with its beneficial effects, cortisone also produced certain undesirable side-effects. Since then, chemists of several pharmaceutical companies have intensified efforts in the synthesis of many hormone-like drugs, in the hope that one could be synthesized which would relieve pain and inflammation without causing side-effects.

This hope was partially realized with prednisone, the first effective antirheumatic synthetic corticosteroid. Institute clinicians first introduced it into medicine after intensive study with patients at the NIH Clinical Center. They found that it possessed important advantages over the naturally occurring steroids, cortisone and hydrocortisone, and these advantages have been so important clinically that the newer synthetic steroids—still under testing by the Institute—have largely replaced cortisone and hydrocortisone in the treatment of rheumatoid arthritis and allied disorders.

Recent efforts directed at uncovering the environmental and genetic aspects of rheumatic diseases promise to provide much needed basic information about the causes of these disorders. The concept that some of the rheumatic diseases may be caused by hypersensitivity, that is, abnormal sensitivity by rheumatic patients to specific components of their own tissues, has been further strengthened by studies in both animals and man.

Institute scientists caring for research patients in the NIH Clinical Center are conducting studies designed to give a better understanding of what causes disease. This will lead to better diagnostic tests and more effective forms of treatment. For example, Institute scientists studying gout in normal volunteer patients have found the exact mechanism causing the acute, painful attacks of this disease and how the drug colchicine works in relieving them.

Another finding involving both the rheumatic and metabolic disease field dealt with osteoporosis, a "bone-

One therapy for rheumatoid arthritis includes exercises and casts. To straighten this little girl's bent leg, graduated casts at left were put on first; the new cast indicates her progress.

thinning" disease marked by long continuing mineral loss. Institute researchers have found that diets high in calcium may offset further bone-thinning in patients suffering from this disorder, as well as in arthritis patients who are being treated with corticosteroids.

Other Institute findings have led to a better understanding in the areas of blood diseases and burn-shock. These include the cause of a blood disease, neonatal thrombocytopenic purpura, which occurs in infants, shown to be due to blood platelet differences between mother and offspring, and the finding that oral administration of ordinary table salt and baking soda in water is a simple and effective remedy for the emergency treatment of shock due to burns.

Diseases of metabolism involve inherited or acquired defects which interfere with the chemical processes which convert food into energy and body tissues. Research in diabetes, perhaps the best known and most important of the metabolic diseases, has been stimulated by the discovery of the oral anti-diabetic drugs. Studies of their mode of action promise to supply basic information about diabetes itself.

Although many medical advances have come from clinical research alone, many others have resulted from biological, chemical and physical investigations into the fundamental structure, functions and reactions of living tissues and systems in health and disease. Such studies make up the category known as basic research. The variety of studies in this area is mirrored in such developments as the dramatic partial "cracking" of the genetic code by Institute scientists—an accomplishment that provides new knowledge of the machinery of heredity—and the synthesis of a valuable analgesic drug, phenazocine, which in certain types of pain seems more powerful than morphine and yet less liable to cause addiction.

A classic example of how basic research can pay dividends in the mounting campaign against disease has been provided by studies of galactosemia, a rare but often fatal disease of infants and children characterized by an inability to utilize milk sugar. Institute scientists found that children with this disease lacked a single enzyme. Other studies since then have developed practical ways to overcome this inherited defect.

Increasing awareness of certain childhood disorders has led the Institute to establish a Pediatric Metabolism Branch. Here, intensive studies are being conducted on cystic fibrosis, an inherited, generalized disease of unknown cause that is now recognized as one of the leading causes of death in children.

Much of the fundamental and clinical research at the Institute depends on unique facilities which are under constant development. Two such installations are the metabolic chamber and the germfree laboratory. The chamber is a sealed room equipped with intricate automatic analytical and control apparatus, designed to permit a person to live a relatively normal life for many hours while investigators determine his total energy output under a variety of condtions. For germfree research, animals are born and raised in a completely gremfree environment provided with sterilized air, food, and water. Institute scientists are using these unusual animals to determine the effect intestinal and environmental bacteria have on nutritive requirements.

A major activity of the Institute is its large extramural grants program which supports biomedical research at universities and medical centers throughout the country. This program also includes the provision of fellowships and training grants to develop research talent to carry on studies of the causes, diagnosis, and treatment of the rheumatic and metabolic diseases.

Guinea pigs used in nutritional studies are born by Caesarean delivery in a special germfree operating tank designed to prevent the mother from contaminating newborn animals.

National Institute of Child Health and Human Development

The National Institute of Child Health and Human Development was authorized in October 1962 to provide a central focus and coordinating point for research and training activities in two vital areas. Two specialized research centers, formerly located within the Division of General Medical Sciences, the Center for Aging Research, established in 1956, and the Center for Research in Child Health, established in 1961, were transferred to provide the nuclei of the new Institute. But the new Institute represents far more than a rearrangement of present functions and units. Essentially it reflects a new focus of research efforts—both within and outside the Public Health Service.

The primary purpose was not to reassign already existing programs, but rather to supplement and reinforce them with an intensified program of research employing an integrated approach to the health status, needs, and problems of people in the various stages of human development.

The National Institute of Child Health and Human Development differs from the earlier established categorical Institutes in that it is non-categorical and its attention is not focused on any one disease or part of the body, but rather on the whole person, with its complex of health problems and requirements. The Institute seeks to provide emphasis, for example, on the special health status and particular needs of special segments of the population—e.g., infants, expectant mothers, adolescents, and aged persons—with common health problems which lend themselves to intensive study.

The goal of the new Institute is a healthy infant, child, adult, and older person, as attained through prevention of disease and based on further knowledge of normal growth and development. It is hoped to accomplish this through further research and training programs aimed toward a better understanding of the total growth and development process. Hence, more knowledge will be uncovered concerning these changes, their causes, and their significance in both normal and abnormal conditions. Studies begin at the preconception level and continue through the prenatal period, infancy, childhood, maturation, and the aging process. Greatly needed coordination and organization of such research specifically pointed toward growth and development is one of the Institute's aims.

The study of child health includes frequent checkups during the formative years, and from facts learned in this research come new clues concerning normal human development.

Despite the deliberate emphasis on child health research and the aging process in the program of this new Institute, the categorical Institutes of NIH continue their primary responsibility for research in their particular disease categories with respect to children and elderly people, as well as other segments of the population.

This developmental approach to health research offers great promise. Its research and the research it supports cuts across individual diseases and disease groups. In departing from the disease category approach in establishing the Institute, there is no attempt

to curtail or deemphasize research activities of the older Institutes. The objective is to reinforce the existing structure of categorical Institutes by providing proper administrative coordination of research activities in two important areas which—although not focused on a particular group of diseases—are essential to any broad advance in the health sciences.

The National Institute of Child Health and Human Development needs to call upon many scientific disciplines, including the behavioral sciences, the biological sciences, and the medical sciences, in order to accomplish the broad tasks proposed.

A good percentage of the problems are in the realm of basic sciences relating to the processes of human growth and development. Support of basic research leads to enormous dividends in the conduct of applied research, especially in the health problems and requirements of children and aged persons.

It is evident that events occurring within the developmental span of life certainly have a serious impact upon adulthood and the declining years, and they cannot be disregarded for it is apparent that life is a continuum. The same factors, genetic or otherwise, that related to the capabilities of the child also relate to the capabilities of the older individual. Imaginative total-life studies are needed to meet the challenge of the increasing life span. Institute scientists in planning their research give emphasis to the unique aspects of the processes of deterioration, both biological and behavioral. That is why fundamental studies in association with clinical studies are required.

Specifically, the program of the National Institute of Child Health and Human Development seeks to encompass research and training in the following general areas:

1. The biological and physiological aspects of the process of human reproduction, growth and development. Studies of genetics, comparative anatomy, physiology, and biochemistry will be supported in relationship to the problems of child health and human development.
2. Studies in the prenatal and perinatal period in human development, from conception until shortly after birth.
3. Obstetrical and pediatric problems not directly related to the specific disease interests of the categorical Institutes.
4. Studies in the process of maturation, including physical, intellectual, and social development, with emphasis on the behavioral aspects and on normal development.
5. Studies in special problem areas such as mental retardation.
6. Studies in biological, medical, and behavioral aspects of aging.

The years from childhood to old age form the patterns of human development. The developmental process is part of life and research is the path to understanding it.

National Institute of Dental Research

Since the establishment of the National Institute of Dental Research in 1948, the scope of dental research has undergone an evolutionary redefinition. From an early emphasis on the development of a rational basis for understanding the natural history of the teeth and their supporting structures, dental research horizons have expanded to include more of the biological and medical sciences. Thus, with increased knowledge of oral biological systems has come a better understanding of their interrelationships with the body as a whole.

In the early years of the Institute's intramural program, major research activity derived from the discovery by NIH workers in 1938 that the element fluorine in drinking water provides substantial protection against dental caries. Determination of the proper concentration of fluorine and the ruling out of any harmful effects were further achievements. After almost two decades of studies, such as that in Grand Rapids, Mich., communities throughout the world are experiencing beneficial results not only in children born subsequent to fluoridation, to the extent of 60–65 percent reduction in dental caries, but also in children whose teeth had already calcified before the beginning of fluoridation. Although dental caries is still a major health problem, each passing year sees progressive benefits to communities with fluoridated drinking water.

Scientist examines picture of mineral crystals from tooth enamel, photographed under the electron microscope. (Magnified 300,000 times.)

The study of factors that affect oral health is complex, and embraces many scientific disciplines related to biology. Dental Institute scientists are engaged in studies in oral bacteriology, pathology, biochemistry, epidemiology, genetics, and biophysics. Using the electron and X-ray microscopes, they are studying enamel and dentin to learn more about the submicroscopic structure and physical and chemical properties of the teeth. They are investigating the manner in which chemical agents, such as fluorides, may alter the structure and properties of growing and mature enamel, and thereby contribute a resistance to dental decay.

Also under way is basic research on cleft palate and other congenital anomalies involving growth and development of the oral and facial regions; microbiological and chemical studies of calculus—a recognized local factor in the causation of periodontal disease; and development of newer, recently advanced concepts of dental caries etiology using the germfree animal technique. Under intensive study by this technique are the many types of microorganisms associated with oral disease, and the use of antibiotics and other therapeutic agents.

The study of nutrition and dental caries has emphasized changing concepts of the dietary etiology of dental caries. Focus on the necessity for calcium and the avoidance of sugar has been widened to include such diet factors as the quantity and quality of protein, the role of lysine and the cariogenicity of certain heat-processed foods. Of equal interest is the production of dental caries experimentally without a sugar component in the diet. Additional dietary phosphorous studies suggest that the anti-caries effect of phosphates may be as important as dietary calcium.

Several professional disciplines are represented in a multidisciplinary approach to physiological studies of laryngeal and pharyngeal anatomy and function

in children, and cleft-palate patients with speech and feeding disorders. The scientific team includes pediatricians, orthodontists, speech pathologists, a biologist and an otolaryngologist. These studies utilize electromyographic observations of muscle action, motion pictures, X-ray and sound equipment.

In the field of epidemiology and biometry, emphasis is placed on the descriptive and determinative epidemiology of oral disease. It is significant that a study of dental caries by this approach developed the fluoride-caries relationship and established the safcty and feasibility of fluoridation of domestic water supplies. The Institute cooperates with other institutions and Federal agencies in epidemiological studies of oral diseases in the United States, and in underdeveloped countries in many parts of the world.

The Institute encourages clinical application of basic laboratory findings as they relate to cause, diagnosis, treatment, and prevention of oral disease. Through coordination of clinical and basic research in the study of periodontal diseases, dental caries, tissue healing, dental anesthesia, and other subjects, the dental profession, and indirectly the Nation's population, will receive ever-increasing benefit.

The research grants program of the Institute contributes significantly to knowledge of underlying factors in oral health and disease. Research activities in the Nation's dental schools, and in many hospitals, local health departments, and other institutions, receive financial support from the Public Health Service. Of additional importance to the future of dental research in the United States are the graduate research training programs in many dental schools and universities. These programs are specifically designed to train graduate students in the basic and clinical sciences related to the different specialties of dentistry, and thereby maintain a continued supply of qualified teachers and researchers. Such training programs, coupled with an increased number of fellowship awards and individual research project grants, represent a decisive forward step in the development of dental research.

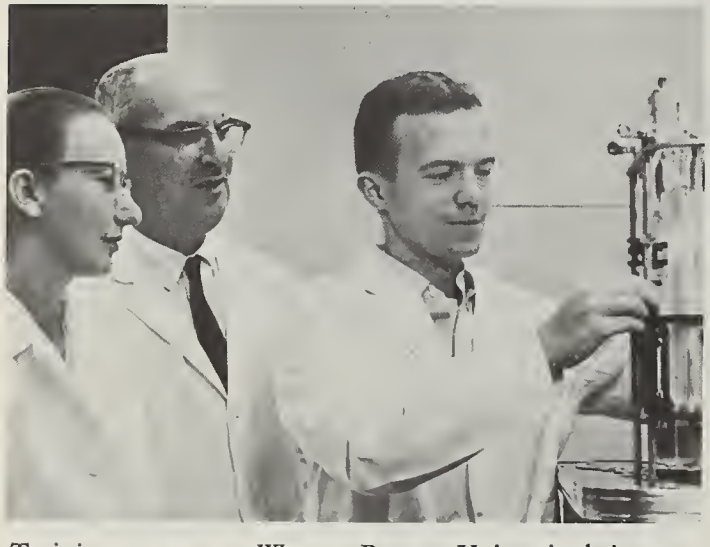
Research in dental diseases is aided by use of germfree animals reared in the sterile atmosphere of pressurized tanks in the NIDR laboratories.

National Institute of General Medical Sciences

Medical research is a basic mission of all the National Institutes of Health. In each of the Institutes, research is directed toward the solution of medical problems peculiar to a given broad disease category. In doing so, it performs and supports fundamental studies that are directly relevant to its total program.

The National Institute of General Medical Sciences, on the other hand, has no specific categorical mission. The work it supports is usually not related to any particular disease, but is designed to provide the fundamental understanding of the structure, organization, and functions of living cells and organisms upon which all disease-directed research is based. In such a setting a general responsibility of the Institute is to develop programs in such a manner as to maintain vigorous activity in the area of science which now as in the future will be directly and generally supportive of the "mission-oriented" institutes.

Authorized by Congress in October 1962, the National Institute of General Medical Sciences is the successor to the Division of the same name established 4 years earlier to support through grants-in-aid research in basic medical science. Today the Institute is sponsoring some 2,000 fundamental research programs in anatomy, biochemistry, pathology, pharmacology, microbiology, and physiology.



Training program at Western Reserve University brings two graduate students in biochemistry into a conference with the head of the department to discuss electrophoresis in protein chemistry.

The Institute of General Medical Sciences maintains no laboratories in the buildings of the National Institutes of Health. It sponsors and supports through research grants investigations in research institutions throughout the United States, and to a small extent in other countries. Thousands of research applications are given thorough, conscientious and impartial review every year by competent scientists. The ones deemed worthy and significant are underwritten and the scientists can pursue their investigations in an appropriate manner and report freely on the results of their research.

Today's biological scientists have pushed the frontiers of knowledge beyond the subcellular level to new areas of submolecular phenomena, bringing us closer to an understanding of the specific function of each *part* of a molecule, and of the relationships of chemical processes to health and disease. In addition, new concepts are emerging in the sciences of biophysics and biomathematics, where mathematical models and systems can be programmed to simulate biological functions and reactions. Meanwhile, other scientists are expanding the uses of electron microscopy and making steady progress in instrumentation, automation, and bioelectronics.

The Institute supports research and research training in those scientific areas which provide a common basis for understanding a wide range of disease and health problems:

1. The basic medical, biological, preclinical, and the related natural and behavioral sciences, such as biochemistry, biophysics, molecular biology, cellular biology, anthropology, enzymology, and pharmacology.
2. Certain clinical studies, such as general surgery, orthopedic surgery, dermatology, pathology, and anethesiology.
3. Methods of science, such as electromicroscopy and biostatistics.

While support for today's research is important, it is equally vital to provide for the continuation of research tomorrow. Therefore the Institute of General Medical Sciences, through its training and fellowship

programs, seeks to provide scientists for the future and teachers for these scientists.

The Institute's training program provides funds to medical schools and other training institutions to help increase the supply and quality of medical and biological investigators.

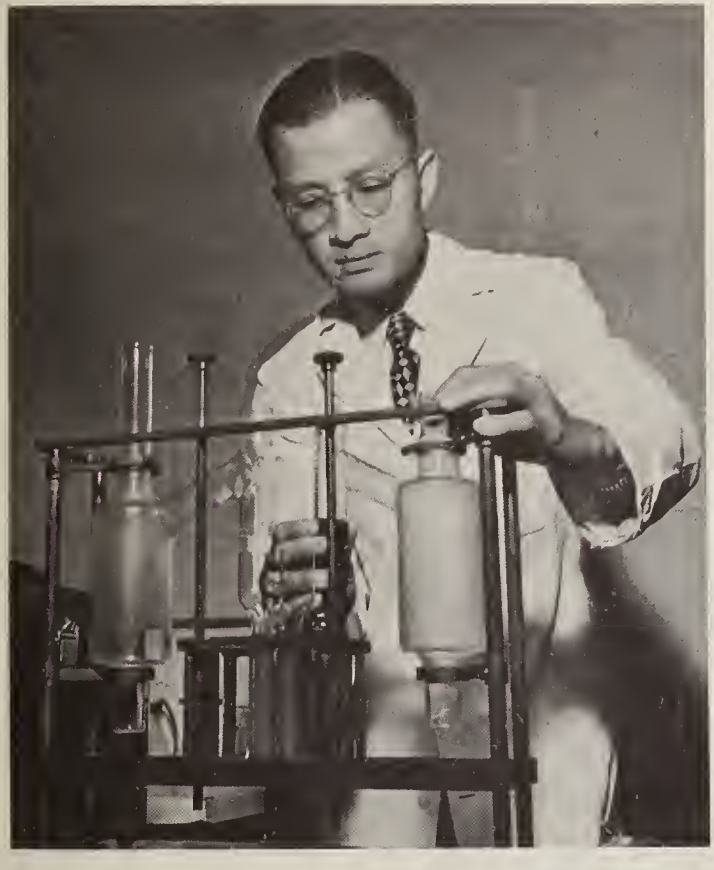
Through its research fellowship program there are opportunities for intensive training of scientists both before and after they have received the Ph. D. degree.

A research career award program and a research career development award program provide stable career opportunities for qualified scientists in the health-related sciences.

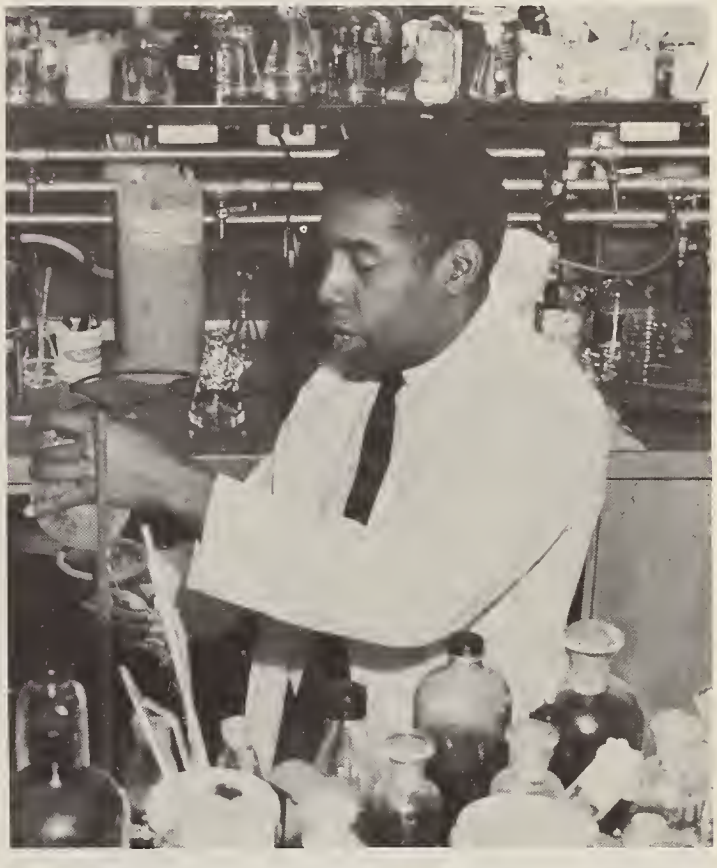
These training programs are designed to attract graduate students who have a high potential for development as creative, independent investigators and to provide them the opportunity to produce the best work of which they are capable.

As in the case of research grants, training activities and career awards are subject to careful evaluation by impartial scientific bodies. To permit the development of skills in these interrelated and complex fields, the training program has provided funds for a new depth and quality of education, leading to increased manpower for medical research and the provision of scientific faculty members for schools of medicine, dentistry, public health, and veterinary medicine.

In almost every research institution in the United States, and in an appreciable number of foreign laboratories, the support of the Institute of General Medical Sciences is helping provide for the basic scientists of the future, and the students who will be faculty members in graduate schools of biology and medicine. Their work will be exploration in the problems of the basic biomedical sciences, and the development of the methods and tools that will be needed in such explorations of the life sciences in the future.



In a research program at the University of California, a scientist is working on the isolation and properties of ACTH and related peptides.



Fellowship program at Harvard Medical School is preparing research scientist for academic career in microbiology. About 8,000 awards for fellowships and training grants are made each year.

National Institute of Mental Health

The National Institute of Mental Health, established in 1949, is the focal point for the Federal Government's efforts to gain knowledge about the mental illnesses and promote sound mental health. The Institute's program encompasses research into the causes, prevention, and treatment of mental illness; training of mental health personnel; and assistance to the States in developing community mental health services.

During the past 15 years, mental illness has become a widely recognized public health problem. The economic, social, and human losses occasioned by the mental illnesses are incalculably great. The nation's public mental hospitals alone contain more than 500,000 patients. In addition, mental illness underlies many of our most disturbing problems of family and community life, including juvenile delinquency, alcoholism, and drug addiction.

Our major mental health needs are for:

- More knowledge about the causes and treatment of the various psychoses and emotional disorders.
- More trained professional personnel to do research in mental health, to train others, and to provide mental health services, especially at the community level.
- More mental health facilities, particularly clinics providing a broad range of mental health services.
- New ways to prevent mental illness.
- Greater public understanding of the nature of mental illness.

Research scientist tests reaction and behavior patterns of a monkey in animal studies which give clues to human behavior.

The Institute awards grants to support research spanning a wide range of physiological, psychological, and sociological sciences. Studies range from basic biological investigations to explorations of social factors affecting human behavior. Among the subjects studied are the psychoses, neuroses, psychopharmacology, industrial mental health, alcoholism, mental retardation, school mental health, and psychological aspects of aging. The Institute supports institutional as well as individual grants for investigators concentrating on key mental health areas.

In the Institute's own laboratories, the interdisciplinary approach is emphasized. Clinical studies concentrate on biological factors in schizophrenia, the chemical organization and metabolism of the nervous system, psychopharmacology, drug addiction, effects of stress on the human organism, child and family studies, and effects of family relations on all types of psychiatric disorders.

The second phase of the Institute's program—training—is geared to meet acute shortages of qualified mental health personnel. The Institute awards fellowships and research career awards which provide for positions in which scientists, including young investigators with promise, can be free to engage in research and related activities.

To increase the number of trained mental health workers, the Institute awards grants to enable educational institutions throughout the country to expand graduate training programs and provide trainee stipends to psychiatrists, clinical psychologists, psychiatric social workers, psychiatric nurses, and other personnel in the biological and social sciences related to mental health.

The Institute also supports psychiatric residency training of general practitioners, training for undergraduate medical students in human behavior, and special postgraduate courses for physicians who wish

to increase their knowledge of psychiatry while continuing practice in other fields.

In the third phase of its program, the Institute helps the States develop comprchensive community mental health programs. One method is through grants-in-aid to the States which, supplemented by State and local funds, have encouraged the growth of a wide range of vital community mental health activities. The Institute also gives professional and technical assistance to the States through consultation, surveys of special mental health problems, conferences and demonstration projects. A third approach is through mental-health project grants which support projects, surveys, conferences, and research designed to develop improved methods of diagnosis, care, treatment and rehabilitation of the mentally ill. In general, community services programs are designed to disseminate and apply new knowledge about mental health, expand preventive programs, and integrate mental health activities into the life of the community.

Through its comprehensive program of research, training, and community services, the Institute hopes eventually to eliminate the scourge of mental illness by bringing new knowledge of thc mental illnesses and mental health services to all those in need of them.

Serum from patients is studied for effects of normally occurring stresses which may influence levels of various hormones.

NIMH psychiatrist meets with all members of the family of an emotionally disturbed patient during a family therapy session.

National Institute of Neurological Diseases and Blindness

The marvel and the mystery of the brain and central nervous system in health and disease stimulate research at the National Institute of Neurological Diseases and Blindness. The brain controls all physical and mental action. While it makes up only 2 percent of the body weight, the brain requires one-sixth of the heart output and consumes nearly one-fifth of the oxygen used by the body.

Lack of oxygen for the brain cells is a well-known cause of rapid and permanent brain damage. Yet further discoveries continue on the causes and results of oxygen lack. In an Institute monkey colony in Puerto Rico, when oxygen is withheld at birth, baby monkeys show symptoms resembling cerebral palsy.

Every discovery about the brain offers a possible clue toward conquest of the 200-odd neurological ailments in which the Institute faces research problems. Improvements of the technique of artificial low body temperature called hypothermia make neurosurgery of the brain safer, and improve the medical care of brain injury and an increasing number of ailments.

An unprecedented attempt to find the causes of cerebral palsy, mental retardation, congenital blindness, and kindred defects in children was launched by the Institute in 1959. About 50,000 women throughout the country are being studied from early pregnancy through delivery. Their infants are being observed intensively in their critical early hours, and will be followed regularly until 6 or 7 years of age.

Fifteen hospitals and medical centers are collaborating with the Institute on this pioneering program. Obstetricians, pediatricians, and many other specialists are working together to make painstaking observations.

This is the first large-scale research project to gather facts on the period of infant development *before* serious ailments appear. Previous studies always had to look back for possible causes *after* cerebral palsy, mental retardation, or other ailments were diagnosed.

From this study, scientists hope not only to learn more about known causes, but also to discover previously overlooked causes of neurological ailments.

Other ages than early childhood also have their clusters of neurological diseases. Some, such as epilepsy and encephalitis, afflict persons at any age. Muscular dystrophy may be a problem in later childhood. Adults in the productive years may become helpless from multiple sclerosis, myasthenia gravis, or amyotrophic lateral sclerosis. In the later years, the major afflictions are blindness, deafness, stroke, brain tumors, and Parkinson's disease. Institute scientists search for causes, occurrences, ways of improved diagnosis and treatment, and always, of course, prevention.

Neurological ailments add up to the leading cause of permanent disability and the third cause of death in the United States.

Institute scientists discovered a safe and reliable test for early brain tumors. Such tumors absorb more of a harmless, short-lived, radioactive test material than normal tissue. Institute biophysicists built a brain scanner which writes a head-shaped pattern in a painless, rapid test locating any concentration of radioactivity indicating a tumor. This test facilitates effective surgery.

The Institute has several studies involving the evaluation of drugs for epilepsy, headache, multiple sclerosis, and other neurological diseases.

Beginnings are being made toward a complete study by electron microscopy of the entire nervous system.

Patient's eye pressure is tested with an applanation tonometer in glaucoma studies.

Already, an Institute neurocytologist has seen and photographed a hitherto invisible cleft between nerve endings at the nerve junction or synapse. At this region nerve impulses travel from one nerve cell to the next, an essential function for health.

Along with the study of eye disorders such as glaucoma, cataracts, and uveitis, Institute ophthalmologists are making electron microscopy studies of the eye covering, lens, and optic nerve.

Biochemistry offers a great hope for prevention and treatment of several neurological ailments. Both histochemistry and cytochemistry are improving the sharpness of diagnosis of the various neuromuscular diseases, and adding hope for discovery of treatments.

Research in the new field of human cytogenetics (microscopic studies of cells and their chromosomes) has started at the Institute.

Epidemiology is increasingly used to study the occurrence of neurological diseases. In multiple sclerosis, for example, in the United States and other countries, many more cases have been found in colder than in warmer climates.

Research grants support both basic and applied research projects comparable to those carried on inside the Institute. One large cooperative study on prevention of cerebrovascular diseases investigated anticoagulant medicines to discourage repeated brain damage from blood clots. Another study sought best ways of controlling the swollen, weakened blood aneurysms which threaten the brain.

In recent years, the number of investigators prepared for neurological research has been increasing with the aid of Institute training grants. This has quickened the tempo of research and is multiplying the possibilities of helpful discoveries.

Two Serum Center technicians file blood samples in one of NINDB's deep-freeze storage rooms.

Clinical Center

The Clinical Center symbolizes the remarkable increase of public interest in medical research since World War II. Congress in 1947 authorized establishment of the Center to provide clinical study facilities and additional laboratory space at NIH. Construction was begun the following year, and the first patients were admitted on July 6, 1953. The full capacity of the Center is 516 patients and approximately 1,100 laboratory units.

Antedating all scientific specialties, and more important now than ever before, is the study of health and disease in individuals. This is the science of clinical medicine as practiced since ancient times by physicians in homes and hospitals. To a great extent, medical knowledge has grown by just this process. In observing sick humans and attempting to restore their health, physicians are constantly acquiring new evidence concerning the causes of illness, and developing better methods of diagnosis, prevention, and treatment. Today this process of observation and discovery is accelerated by special research facilities such as the Clinical Center.

If medical knowledge is to continue to advance, sharp lines cannot remain between various health problems and scientific approaches. Here is where clinical medicine, which concentrates on the whole man, serves its greatest research mission. The Clinical Center was planned so that representatives of all the medical sciences could work together closely with clinicians, contributing not only to one another's research but also to the more effective treatment of patients. The Center is equipped so that every research tool needed by these workers is available.

The division of space in the Clinical Center reveals its coordinating function. Each Institute has patient bedrooms and research laboratories in close proximity. The facilities for diagnosis, medical and nursing care, social service, rehabilitation, and recreation are comparable to those found in any good modern hospital.

The laboratories are so designed that they can be readily modified to meet the changing requirements of research with a minimum of delay and expense.

That the Clinical Center is more than a hospital is illustrated by its carefully selected patient population, which includes both sick people and normal volunteers.

Patients are selected solely because they have a condition needed in a particular study by one of the Institutes sharing the Center. They must be referred by individual physicians or other qualified medical sources, and they are accepted from any part of the country. Hospitals, clinics, family physicians, and specialists in various diseases not only refer their patients, but through consultation, followup treatment, and observation, actively participate in the research.

Normal volunteers are carefully selected on a medical basis, also, and they must be referred by a reputable community agency willing to sponsor them. These healthy "patients" play an important part in helping

The Clinical Center's two "pools of Bethesda" offer outdoor areas of relaxation for NIH patients.

scientists gain knowledge of what is normal and healthy, which is often a prerequisite to a more thorough understanding of the ills that befall mankind.

Many studies depend upon the patients' remaining in the Center for long periods—often 3 or 4 months. The approximate length of stay is explained to patients at the time of admission. It is also explained that they will be discharged back to the care of their own physician when their participation in a study has been completed and when their condition permits. After discharge, followup examinations or treatment may be given periodically for a few months to 10 years or more—a most important procedure in medical investigations. Special facilities for the comfort and morale of patients encourage them to stay for the entire time they are needed and to return to the Center upon request. Patients do not pay for the nursing and medical care received while they are participating in a research project. However, transportation costs are not borne by the Center.

As in every good hospital, the medical and surgical care received here is based on the ruling concept that the welfare of the patient has priority over all other considerations.

The methods of treatment employed are substantially the same as those accepted and used by well-qualified physicians everywhere. Far more extensive and frequent, however, are the laboratory tests and other examinations made for research purposes. All clinical studies are reinforced by fundamental laboratory investigations. Conversely, many laboratory investigations are stimulated and enhanced through the close relations maintained with clinical medicine.

Much of the above is summarized in six basic principles that have guided NIH in its clinical research program:

- The individual selection of Clinical Center patients is based solely on the part each can play in a specific study.
- Patients selected as research subjects are given medical care of the highest quality.
- The design and operation of the Center foster interchange of ideas and skills among all the major biological and medical specialties—basic laboratory, preclinical, and clinical.
- Resources of the Center are available for collaborative research by established scientists from other institutions, and opportunity is provided for able young clinicians to gain specialized training for independent careers in research medicine.
- In assembling the staff, every effort is made to minimize the impact on local medical and educational institutions.
- In obtaining patients for study, close collaboration is maintained with physicians, hospitals, medical schools, and clinics—the purpose being not to interfere or compete, but rather to permit medical practice, teaching, and research to proceed together in harmony.

Modern, semiprivate rooms are available for more than five hundred Clinical Center patients.

Speech therapy is provided for Clinical Center patients when needed. This little patient and the therapist are perfecting the word "cow."

Division of Research Grants

The Public Health Service research grants program in 1946 consisted of a small number of cancer grants. In addition, the Service was given responsibility for 50 promising research projects that were begun during World War II by the Office of Scientific Research and Development, a war-emergency agency.

The successful completion of the transferred projects, following the spectacular results attained by grant-supported medical and other research for military use during the war, aroused the interest and subsequent support of the Congress. This support, manifested by annually increased appropriations, has evolved a grants program that functions on a national and international level.

Nationally, the Public Health Service program now includes not only some 15,000 research grant awards anually, but about 8,000 awards for fellowships and training grants and, in fiscal year 1963, $50 million in grants for construction of health research facilities throughout the Nation.

On the international level, grants are awarded to support research projects in leading medical centers throughout the world, and promising scientists from other nations are afforded fellowships which provide support for study in U.S. medical research centers.

A major portion of the Public Health Service grant program is coordinated and centrally administered within the Division of Research Grants at the National Institutes of Health.

Research grant applications receive technical review through the Division's Study Sections—consultant groups of non-Federal experts in the medical and biological sciences. Their standards, over the years, have been kept uncompromisingly high; at present less than two out of three research grant applications are recommended for approval, and less than half of the funds requested are approved. These Study Sections are organized according to scientific disciplines, such as biochemistry or surgery, or health problems, such as accident prevention. Action to be taken on each application is recommended by the Study Sections to the National Advisory Councils of the Institutes concerned, and to the Surgeon General of the Public Health Service. The Study Sections also develop and encourage research in neglected areas of the health, medical, or related sciences.

Fellowship applications are reviewed by the Division's Central Qualifications Board, made up of 10 fellowship review panels which are also organized by scientific disciplines. These panels also consist mostly of non-Federal university scientists, and they, like the Study Sections, confine themselves to technical, preliminary review. Their recommendations are transmitted to Specialty Fellowship Boards in the Institutes in whose fields the candidate's interests fall. The Fellowship Review Panels also report on training needs in their fields.

In the area of grants management, the Division serves as NIH's coordinator of all financial procedures having to do with grants, and as a source of information and central contact point at NIH for financial officers in over 1,200 grantee institutions. The Division advises bureau and agency officials in financial management matters, and plays a leading role in policy formulation. It also provides the mechanism for implementing payments of grants by the Treasury, and maintains records on these payments, as well as records on expenditures by the grantees.

In order to help guide medical research planning, the Division maintains a Statistical Processing Branch to "keep track" of the more than 20,000 active grants and awards of all types that comprise the extramural program. The Division collects data from applications and other sources; codes the data on magnetic tape for NIH's electronic computer—a system which increases the data's accessibility and the speed of retrieval by thousands of times over hand methods; and

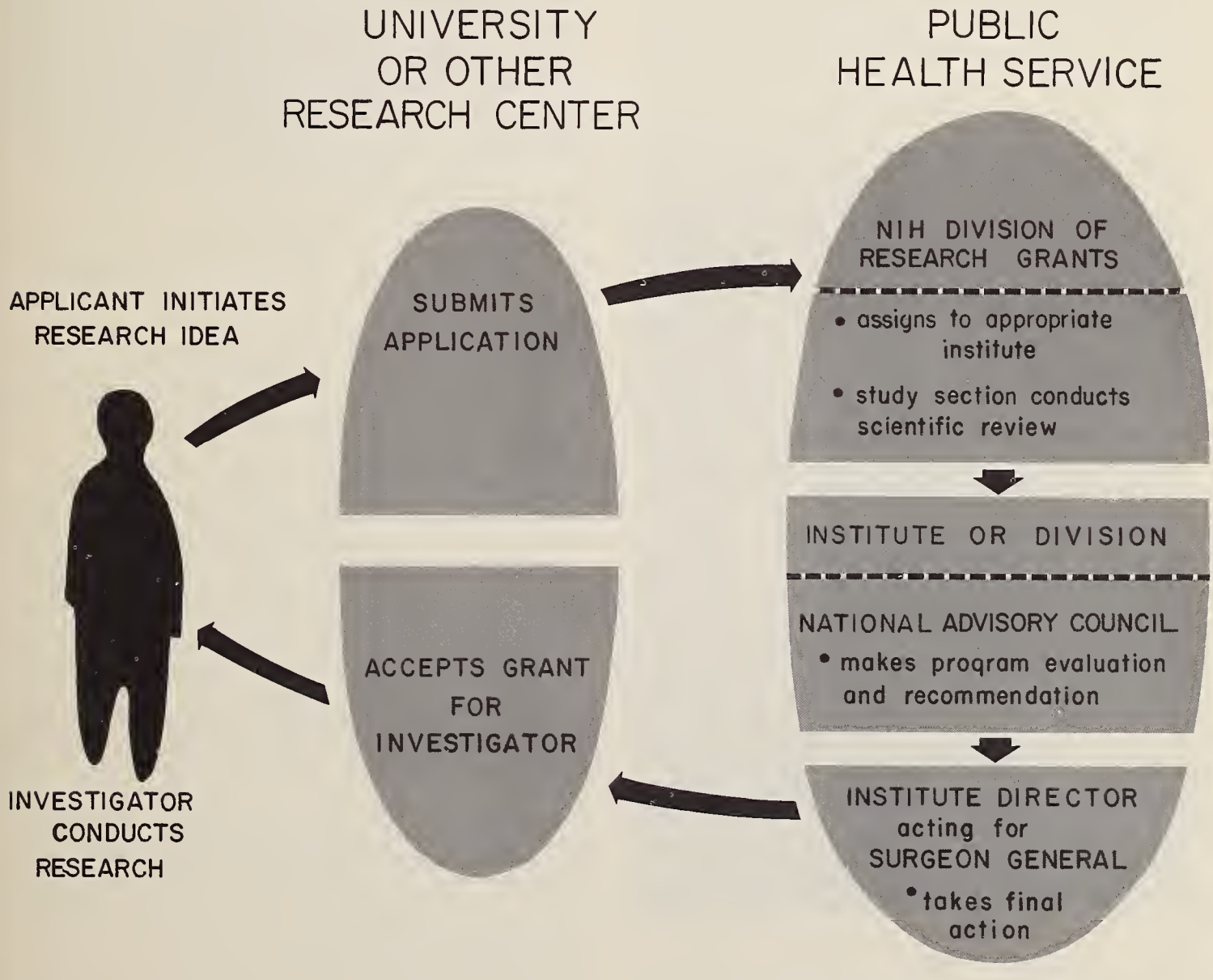
produces compilations, analyses, and special groupings to accommodate the many requirements of program management. Many statistical reports, both periodic and special, are published annually.

Many other central services for the Institutes and for the extramural program are provided by the Division of Research Grants.

For example, the Division maintains staff to help coordinate and enforce Public Health Service policy in the patent area, and to answer the large number of inquiries from scientists developing inventions or drugs under NIH grants.

An Office of Research Accomplishments produces broad-scale staff studies and reviews of various scientific fields and aspects of the extramural program, and conducts a continuing evaluation of its achievements for the information of NIH management and other public officials with an interest in health and medical affairs.

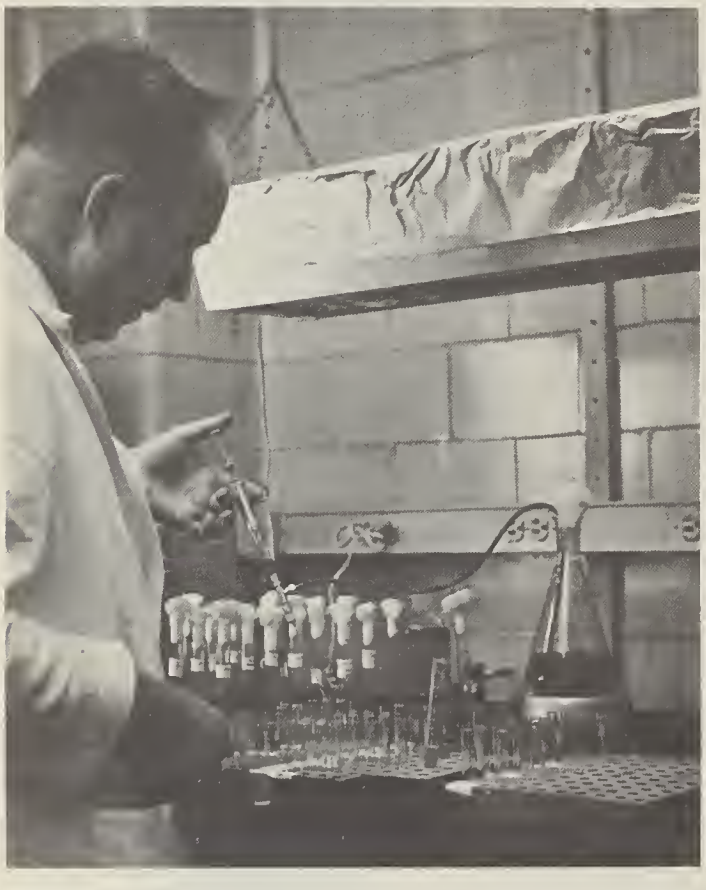
A Research Documentation Section collects data and information on the scientific content of all projects conducted under NIH research grants. This Section's contributions are particularly useful to administrators and advisors concerned with maintaining balance in the program, and to scientists needing information about the work of colleagues. To help meet the latter need, the Section publishes an index each year to the scientific content of all current NIH-supported research projects. The index provides a quick reference key to all work being done by grantees on any subject falling within the spectrum of medical and biological research.


UNIVERSITY OR OTHER RESEARCH CENTER
PUBLIC HEALTH SERVICE
APPLICANT INITIATES RESEARCH IDEA
SUBMITS APPLICATION
NIH DIVISION OF RESEARCH GRANTS
• assigns to appropriate institute
• study section conducts scientific review
INSTITUTE OR DIVISION
NATIONAL ADVISORY COUNCIL
• makes program evaluation and recommendation
INSTITUTE DIRECTOR acting for SURGEON GENERAL
• takes final action
ACCEPTS GRANT FOR INVESTIGATOR
INVESTIGATOR CONDUCTS RESEARCH

Division of Biologics Standards

The primary function of the Division is its responsibility for the standards of quality and safety of biological products that come within the jurisdiction of the Public Health Service. These products cover a broad area including vaccines, antitoxins, therapeutic serums, and human blood and its derivatives. Since they are developed for the most part from pathogenic or potentially pathogenic microorganisms, their preparation requires careful control in order to minimize safety hazards which might occur during processing and to ensure final products of satisfactory potency. Accuracy is essential in every step, for the end product is the preservation of human life.

Effective administration of these responsibilities requires the design and development, within a research context, of adequate and practical standards for the production and testing of biologics, careful surveillance of production methods, and the continuous improvement of testing procedures. Because this area is one of rapid and constantly changing discovery and development, the Division's control program is necessarily supported by an active and flexible research program, enabling the Division to keep pace with the rapid development of new and improved immunizing agents and to prepare physical references as well as to develop testing procedures for these products once they are ready for commercial production.



Washed chicken red blood cells are added to a mixture of influenza virus and dilutions of human sera in an assay of influenza vaccine.

The control functions of the Division are carried out under the provisions of the Public Health Service Act, which requires that all biological products, as well as the establishments manufacturing these products, be licensed by the Federal Government as a means of ensuring their safety, purity, and potency. At the close of fiscal year 1962, 196 establishments were licensed to produce 288 specific products for commercial use in this country and abroad. The Division is responsible for recommending the licensing of these products, establishing standards for each product, and seeing that such standards are maintained. Requirements based on the best scientific information available are developed for each product.

Dealing directly with the scientific personnel of the pharmaceutical industry, the Division makes regular inspection of the manufacturing plants, reviews protocols of all manufacturing processes, and sample tests each product. Over the years, the control function has been administered with emphasis on consultation between government and industry in order to identify potentially hazardous procedures, to establish measures of prevention to increase safety, and to institute testing methods capable of assuring the quality of these products.

Of equal importance in ensuring the continued safety, purity, and potency of biological products is the preparation and distribution of physical reference standards to manufacturers and laboratories engaged in biological standardization. Approximately 4,000 vials of such standard preparations are distributed each year by the Division. Continuous efforts are made to

The respiration rate of monkey kidney tissue culture cells, used for the growth of poliovirus in vaccine production, is measured under various conditions on the Warburg respirometer.

improve the methods of preserving and storing these standards, and to correlate them with standards established in other countries.

Although the research programs of the Division are concerned largely with its basic function—the control of biological products—by their very nature some of these activities are basic research. Moreover, since both control and research programs are product-oriented, their scope, direction, and intensity are largely dictated by the need to provide essential information for developing requirements and regulations for the licensing of new biological products such as the live poliovirus and measles vaccines, for commercial use. Problems often arise, however, concerning long-established products. The Division must, therefore, maintain an active interest in areas of research which are no longer of primary concern to the scientific field as a whole—for example, smallpox, typhoid, and the rickettsial diseases.

The activities and responsibilities of the Division of Biologics Standards are based on the "Biologics Control Act" of 1902, passed to regulate the sale in interstate commerce of vaccines, serums, toxins, antitoxins, and analogous products applicable to the prevention and cure of diseases of man. While some amendments have been made, the statute, now included in the Public Health Service Act, is basically the same as it was at the turn of the century when the technical responsibilities of the biologics program were assigned to the Hygienic Laboratory. In June 1955, authority was granted the Surgeon General to expand the biologics function of the Public Health Service by creating the Division of Biologics Standards within the National Institutes of Health.

The Division is prepared to meet new needs occasioned by the expanding range of diseases to which biological products are applicable and the accelerated discovery of such products, particularly in the field of virology. It is anticipated that biologics yet to be developed will greatly increase the Division's responsibilities.

The pyrogen test for toxicity is one of several safety tests applied by the Division to a variety of biological products.

Division of Research Services

The Division of Research Services provides facilities, equipment, and a wide variety of scientific and technical services essential to the needs of the medical investigators and research administrators at NIH.

It is one of several NIH Divisions created to supplement the categorical research programs of the Institutes. The research contributions of its personnel are often the result of close collaboration with Institute scientists.

Through the design of precision instrumentation, for example, the achievements of bioengineers and skilled technicians employed in the Division are directly linked to major research efforts at NIH. Instrument makers have contributed to mental health and neurology research by developing an apparatus that first generates electrical pulse trains to stimulate cortical areas in the brain, then displays and photographs the resultant cell discharges on an oscilloscope. They have developed an automated instrumentation system whereby sequential functions in clinical pathology can be televised and photographed at precise time-intervals.

The Division provides the NIH research investigator with (1) data processing and biomedical computing services for recording and correlating the information obtained in the course of performing his experiments, (2) a growing collection of scientific literature and translations by means of which he keeps abreast of new developments in his own field and in all other research areas, (3) charts, photomicrographs, exhibits, clinical illustrations, slides, and motion picture services for visual documentation of his research findings, (4) conventional and inbred animals for experimental work in the laboratory, and (5) planning and consultation on laboratory design, instrumentation, and healthful environmental conditions.

In addition, it operates the physical plant at Bethesda and the NIH Animal Center, a 500-acre animal farm for holding and treating laboratory research animals. The Center includes a farm animal

This rhesus monkey is used to help train Animal Hospital personnel in the techniques of animal handling and netting.

building, a dog and cat kennel with an attached animal hospital facility, and a power plant.

In years past the Division's sanitary engineers pioneered efforts to produce germfree animals at NIH, to sterilize animal food and equipment, and to design lightweight, portable chambers for the transport and delivery of these animals. They have continued this activity by undertaking the conversion of NIH facilities for the large-scale production of germfree and specific-pathogen-free animals. Sanitary engineers have also contributed to the high standard of laboratory sanitation at NIH by conducting occupational health studies and bacteriological studies of the environment.

To perform and coordinate its multiple bioengineering activities, the Division of Research Services has a staff of electronic engineers, architect-engineers, and civil engineers. Its bioengineers have had extensive training in the life sciences as well as in the basics of chemistry and physics. Other DRS employees are skilled in a wide range of crafts and technical and professional specialties. Included on the personnel roster are biologists, computer programmers, entomologists, geneticists, librarians, medical artists, photographers, scientific translators, veterinary scientists, animal husbandmen, carpenters, electricians, glassblowers, horticulturists, plumbers, tree surgeons, varitypists, and welders.

This array of skills has been assembled to give NIH scientists the necessary tools with which to pursue their research interests under the best possible working conditions.

The scientists replenish their supplies of laboratory glassware and bacteriological culture media from the Division's central service. They order conventional, inbred, and exotic species of laboratory animals from its animal colony, and rely on the animal hospital and on the advice of DRS veterinarians for the treatment of animal diseases. Thousands of small laboratory animals are bred each year for the study of the ills that afflict mankind, and other animals are obtained through commercial, domestic, and international sources.

Plastics research conducted by the Division's medical artists has yielded numerous benefits to NIH in the form of plastic heart valves, museum mounts, psychological testing materials and embedded pathological specimens. Lightweight scientific exhibits are achieved with plastic panels in a variety of contemporary design combinations.

Clinical illustrators and photographers also contribute to the visual documentation of research, and

The medical artist (seated) works closely with a scientist to illustrate complex problems discussed in a research paper to be published in a technical journal.

science librarians and translators help the research investigator communicate his findings to the scientific world.

NIH has one of the world's leading medical libraries, geared to assist scientists in tracking down obscure clues to research problems. The Library gives investigators access to the research reports that shape the course of their projects and outline their methodology.

On another front, the Division has contributed new approaches to computer methodology, in devising new computer techniques applied to the solution of biological and chemical problems.

Its central data-processing service includes a multipurpose computer that possesses significant advantages for adapting computer techniques to the rapid recording and retrieval of laboratory data, to the simulation of biological systems for testing the potentiality of prediction and the testing of mathematical hypotheses, and to numerous other research uses still being explored.

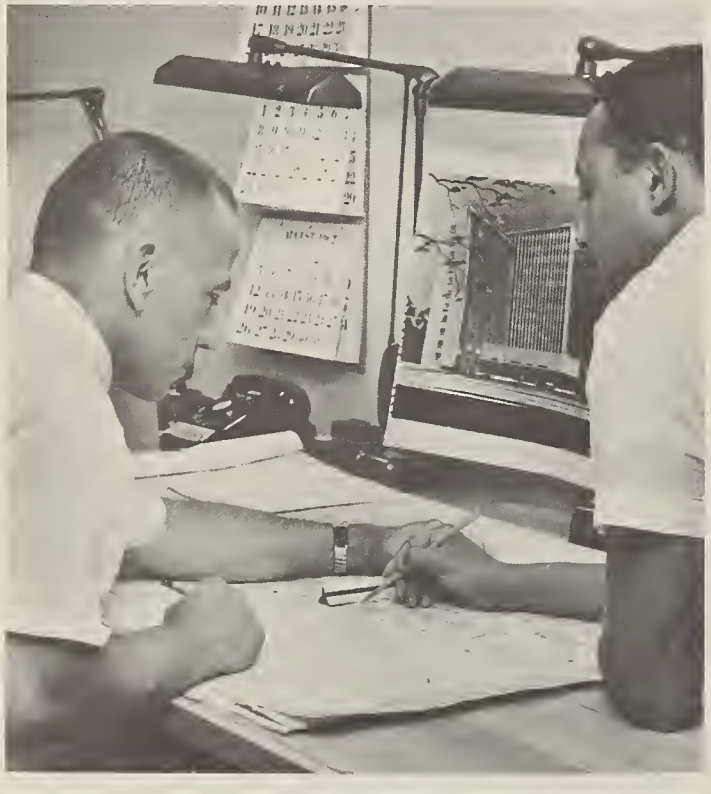
Of the thousands of visitors who come to NIH each year from all parts of the globe, many come to learn in depth about the central research services provided for our research investigators.

Division of Research Facilities and Resources

No scientist, regardless of ability and training, can conduct productive research without good equipment and a suitable place to work. It has been evident for some time that supporting the individual scientist in pursuit of his own research goals is no longer enough. Provision must be made for laboratories and other facilities, for complex equipment, and for unforeseen contingencies.

To meet many of these critical and often costly needs, not easily justified on a categorical or a simple, project-oriented basis, NIH over the years established diverse programs within its Institutes and Divisions. These programs, though dispersed, had in common the support of facilities and resources involving many disease categories and many scientific disciplines.

In 1962, the NIH consolidated these programs into one administrative unit comprised of five branches. This unit, the Division of Research Facilities and Resources, now provides the means for coordinated financial assistance to research institutions. This unified approach permits NIH to assess total institutional needs and to determine the optimum manner in which the research and research training potential can be increased or enhanced.



Architects on the staff of the Health Research Facilities Branch examine plans submitted with an application for a construction grant.

The five branches of this Division and their functions are:

Animal Resources

As the number of biomedical research studies has increased so has the need for more laboratory animals, the usual as well as the unusual species and special strains. Along with the more extensive use of animals in research has developed the field of laboratory animal medicine concerned with the care and proper maintenance of the animals. It is the function of the Animal Resources Branch to support animal resources, animal research centers, to encourage research in the basic problems of diseases of research animals, and to help support post-doctoral training of professional personnel in laboratory animal medicine.

Since 1960, awards have been made for six regional primate research centers where resident and visiting scientists representing many disciplines will study various biological characteristics of primates throughout their life span.

Another activity of the centers will be studies on the procurement, care and handling of laboratory animals; on the best type of housing for particular species; and on the development of certain genetic strains for special medical research purposes.

General Clinical Research Centers

The program of the General Clinical Research Centers Branch supports centers where scientists conduct studies on a wide range of human diseases using the full spectrum of the biomedical sciences. Costs underwritten by the grants include those for renovation, for operational expenses such as staff salaries, equipment and supplies, and for hospitalization.

A discrete unit in a hospital, the general clinical research center is a research ward containing from 8 to 30 beds apart from the general care wards. Each center has a special staff of nurses and dietiticians and its own specialized laboratory facilities. The broad scope of research on many diseases conducted in these cen-

ters and the fact that scientists from many departments of an institution use a center, distinguishes them from categorical clinical research programs.

With scientists from different disciplines working together, opportunities abound for research on any clinical problem and for the stimulation of research ideas. Another asset is that the centers are a model of excellence for clinical research and research training within the institution.

General Research Support

Grants administered by the General Research Support Branch provide funds for direct costs of health research and research training to schools of medicine, dentistry, osteopathy, public health, veterinary medicine, pharmacy, and nursing, and to hospitals and other nonprofit institutions that conduct research.

The unique feature of this grant program is that it permits more latitude in the immediate use of funds than is possible with other types of Public Health Service grants. While granting funds for certain specific purposes, this program also provides for unforeseen expenses which occasionally arise and for which there is no other provision, as for example, a small computer or an animal colony for general research purposes.

General support funds are also used to finance the investigation of ideas that, though promising, are not ready for critical scrutiny by a research grant study section. These grants may also be used to provide stable salaries, enabling scientists and other staff members to continue their work during interim periods of other grant support.

In many instances, a general research support grant appears to have a multiple impact on the institution's research and research training activity as a whole.

Health Research Facilities

Before the rapid acceleration of biomedical research in the last decade, many institutions had limited, poorly equipped laboratories often situated in old and obsolete buildings with totally inadequate space. Medical and other health related institutions need additional research space and equipment for the continuing expansion of research and research training activities. In the competition for high-caliber scientists, institutions have learned that the quality and adequacy of research facilities are often the determining factor.

In some instances, it is possible to expand facilities by remodeling and renovation, but more and more situations indicate that the best and most economical solution is to construct new buildings especially designed to meet modern research needs.

The Health Research Facilities Branch supports the construction and equipment of facilities for health research, research training, and related purposes. Awards are made on a matching basis for up to 50 percent of the construction costs. The program encourages institutions to build needed facilities and to seek funds from non-Federal sources to match those awarded by the Public Health Service.

Special Research Resources

As focal points in universities, hospitals, and other research institutions, centers supported by the Special Research Resources Branch provide unusual and highly specialized research services to many institutional departments and disciplines. Large units of equipment, special laboratories or special animal facilities are among the types of special resources provided by these grants.

Because only maximum use can justify the cost of expensive equipment such as large computers, a major effort of this Branch is the development of regional computer centers for use not only by scientists within the institution housing the equipment, but also by researchers within the region who may be working in mental hospitals, public health departments, voluntary health agencies, medical schools, or Veterans Administration hospitals.

Besides such regional computer centers, special research resources may include centers for biomedical engineering or instrumentation, biomedical communications, an interdepartmental biophysical laboratory, or a facility for the behavioral sciences.

Young patient in a General Clinical Research Center communicates with her scientist-physician.

Office of Administrative Management

The Office of Administrative Management is responsible for providing staff support to insure to line management thc availability of people, appropriated funds, working space, supplies, communications, and protection needed for the research and research support programs of the National Institutes of Health.

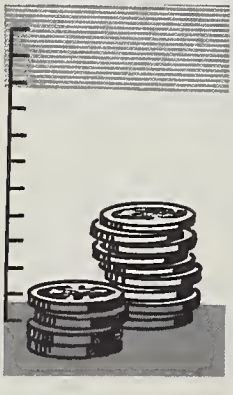
In fulfilling this responsibility the Office of Administrative Management plays a dual role—as advisor and coordinator for the Director in his capacity as principal administrator of a multi-million-dollar undertaking and a service organization in support of the NIH's research effort. It oversees the preparation and submission of the budget and related financial documents, and disburses and accounts for the monies appropriated to NIH; develops policies and gives technical guidance in such fields as personnel, property, and supply; conducts management improvement studies; assures that appropriate measures are taken to insure both the physical safety and security of people, property, and equipment; and consolidates and issues administrative policies and procedures.

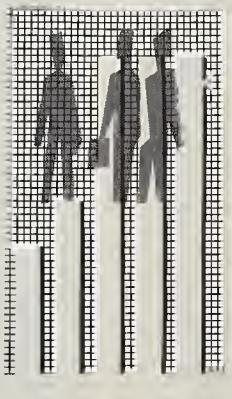
In providing service to the NIH community, the Office of Administrative Management makes every effort to supply the needs of the research scientists and research planning staff and free them from excessive administrative details.

The need for qualified personnel to conduct research, administer the far-flung research grants programs, and staff the various supporting services has led to the development of new methods for locating promising candidates, developing their capacities while on the job, and in general making the NIH an attractive place to work for the professional and nonprofessional alike. Examples of these new approaches on which assistance was provided include the Staff Fellowship Program for bringing bright young scientists to NIH as researchers and the NIH Research Grants Associates Program for the training of scientist-administrators.

With NIH's expanding programs, the question of where to house new projects is often of utmost urgency. Space for new offices, laboratories, shops, and warehouses must be planned in advance of actual need, and once occupied must be tied into the main network of communications through provision of telephone, mail, and transportation services. It must also be maintained, cleaned, and provided with guard and fire protection services.

The supplies, equipment, and services needed for the conduct of research range from alligators to electron microscopes. Some of these items are as close to the scientist as his telephone, using a recently installed charge order system. Others are readily available on the reservation, as for example stationery items, which can be picked up at the self-service store, and duplicating services, which are provided by the print shop, which also sees to the printing of a large volume of official papers and reports. Still others require prolonged negotiation by our research contract staff. Under the charge-order system, and in some other cases, material is delivered directly to the person placing the order. In these and many other ways, the OAM staff plays its part in support of research and in carrying out management responsibilities in the administrative areas.





Office of International Research

Recent years have seen a rapid growth of the scope and magnitude of international medical research activities. The extensive NIH participation in the support of foreign research reflects a willingness to assume an active role in furthering scientific and humanitarian objectives of world-wide importance while providing further medical knowledge for the benefit of the American people. Although less than 5 percent of NIH extramural grant funds have direct and substantial foreign implications, the total international extension of NIH activities now represents the sizable investment of approximately $30 million annually. In order to assume adequately the increasing responsibilities for studying, planning, and advising these vast international activities, the Office of International Research was established within the NIH in 1961.

The Office of International Research is part of the Office of the Director and is responsible for coordinating all international activities of the National Institutes of Health. It advises the Director and the Office of the Surgeon General on matters relating to the international aspects of medical research and research training, and assists the Institutes in the development of international extensions of their programs. It is specifically responsible for administration of the NIH Special Foreign Currency Program which utilizes U.S.-owned foreign currencies, and for coordinating Institute proposals for research under this program in foreign countries.

NIH participates actively in the international community of medical science.

Representatives of OIR follow the careers of former NIH Fellows and Visiting Scientists to appraise the impact of NIH-sponsored research training. They survey foreign research laboratories and medical facilities working under grants from NIH Institutes and Divisions and evaluate the results of this support. They determine the relationship of NIH's international activities to the research programs of other governments, agencies and private foundations, and provide a mechanism to obtain information which helps in the appraisal of foreign grant applications.

In order to evaluate better the effect of NIH activities abroad and to facilitate the administration of its international programs the OIR has established foreign offices for Europe in Paris, France, with a Science Representative in London; for the Pacific Area, in Tokyo, Japan, with a Science Representative in New Delhi, India; and for Latin America with a Science Representative in Rio de Janeiro, Brazil. Each overseas office is staffed by two biomedical scientists and an administrative officer.

The Foreign Awards and Fellowships Section of OIR administers training support granted to foreign nationals for study in the United States. OIR administers the International Centers for Medical Research and Training (ICMRT) program which awards grants to American universities for the establishment of an International Center within their own facilities, thus providing a stable professional framework in which medical research projects, planning and training may be conducted. At the same time the universities establish an affiliate center in a foreign institution, which also has the necessary facilities and scientific and technical competence to support research and training programs of mutual interest.

Although these programs often help to strengthen the medical sciences in foreign lands, they are not designed to provide foreign aid to other countries. Rather they are designed to advance directly the scientific objectives of NIH.

Office of Program Planning

The expansion of medical research in recent years, largely a result of increased Federal support, places upon the National Institutes of Health a heavy responsibility to assess the effects of such growth and of probable future change. Decisions concerning program development, policy formulation, and administration demand continuing study, analysis and planning.

The Office of Program Planning is organized to support the NIH Director in the discharge of his broad administrative and leadership functions.

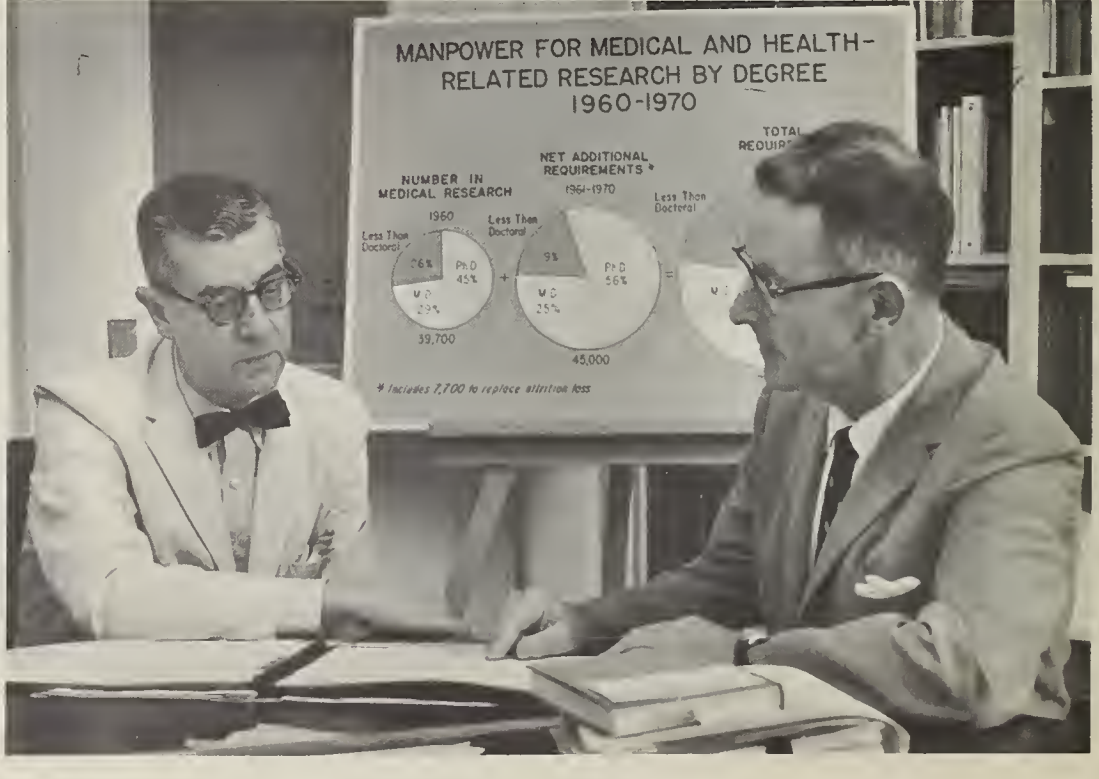
Authority to conduct NIH programs derives from numerous acts of Congress and Executive decisions. As social and scientific changes affect the direction and pattern of medical research, the legislative base may need to be modified. And new legislative proposals must be assessed for their possible effect on NIH programs. Thus, an important area of responsibility for OPP is legislative reference and liaison.

Another responsibility of OPP is the study and evaluation of external factors and trends affecting NIH activities. In particular, national resources for medical research—funds, facilities, and manpower—are investigated, with due attention to socio-economic and other forces influencing medical science. Reports on these studies are issued widely from time to time. Typical have been reports on patterns of science enrollment in the Nation's leading graduate schools. *Resources for Medical Research,* a series, has reported on Federal research expenditures.

The diversity and scope of NIH operations afford an unprecedented opportunity to study research programs on a broad statistical basis. Such a study can serve at the same time as an indispensable aid to program evaluation and coordination. Thus, OPP compiles and analyzes data on Institute and Division activities. An annual compilation, *Basic Data Relating to the National Institutes of Health,* is issued primarily for executive reference.

Special studies by request constitute another area of activity. These involve planning and reporting, often in connection with emerging problems, and may concern any aspects of the NIH mission. Resulting documents, reports, articles, and so forth are directed to staff members, other Government agencies, the Congress, and special non-Federal groups. Among such special studies are those conducted by the NIH historian.

The NIH Director and his immediate staff must be advised of implications of OPP's findings. This function, and participation in the planning that results, are other continuing responsibilities.



The Nation's requirements for the medical research of tomorrow must be met through careful planning today.

Office of Research Information

Through their taxes the people of the United States support more than half the medical research of this country—more than one-third of it through appropriations to the NIH; thus, they have a clear right to know of the results achieved by this expenditure.

Following World War II there was a tremendous surge in interest in professional and public support of medical research and, concurrently, new and broadening informational activities gradually evolved. The scientists pursuing their researches found that they no longer had the time to carry on the informational activities demanded by the press and the public, and the "information specialist" arose to meet this need.

As the Institutes and Divisions were established at the National Institutes of Health, the information role was recognized in establishing legislation.

Each of the nine Institutes and four Divisions of NIH, therefore, has an information office; and all of them have three objectives in common: to promote the improvement of the health of the American people; to report on all NIH activities and accomplishments; and to aid in a public accounting of Federal expenditures for medical research.

The Office of Research Information, as a part of the Office of the Director, NIH, dates from 1955. At that time ORI was given responsibility for providing staff advice to the Director on matters of public and professional information; for handling new and noncategorical information responsibilities; for the coordination of the information activities of the various Institutes and Divisions; for information liaison with the Public Health Service and the U.S. Department of Health, Education, and Welfare; and for insuring that Public Health Service-Department of Health, Education, and Welfare information policies were being followed.

The ORI plans, collects, prepares and disseminates information materials that describe the content and scope of existing research and research training programs, and of NIH research accomplishments. These materials are prepared for various audiences, including the Congress, the medical profession, and the general public.

The ORI reviews all materials prepared at NIH which are intended for publication. This includes articles, scientific reports, leaflets, brochures, and news releases. It publishes the *NIH Record*, a biweekly newspaper distributed to all NIH employees and, upon request, to medical organizations and individuals throughout the United States and abroad. ORI also publishes and distributes the NIH Calendar of Events (a listing of scientific meetings at NIH and in the Washington area) and the *Scientific Directory and Annual Bibliography*.

The American citizen wants to know and must be told of the results of science if he is to be an informed and productive citizen in the 20th Century. The ORI and the information staffs of NIH seek to bring to the citizen the knowledge he needs about the results of medical research today.

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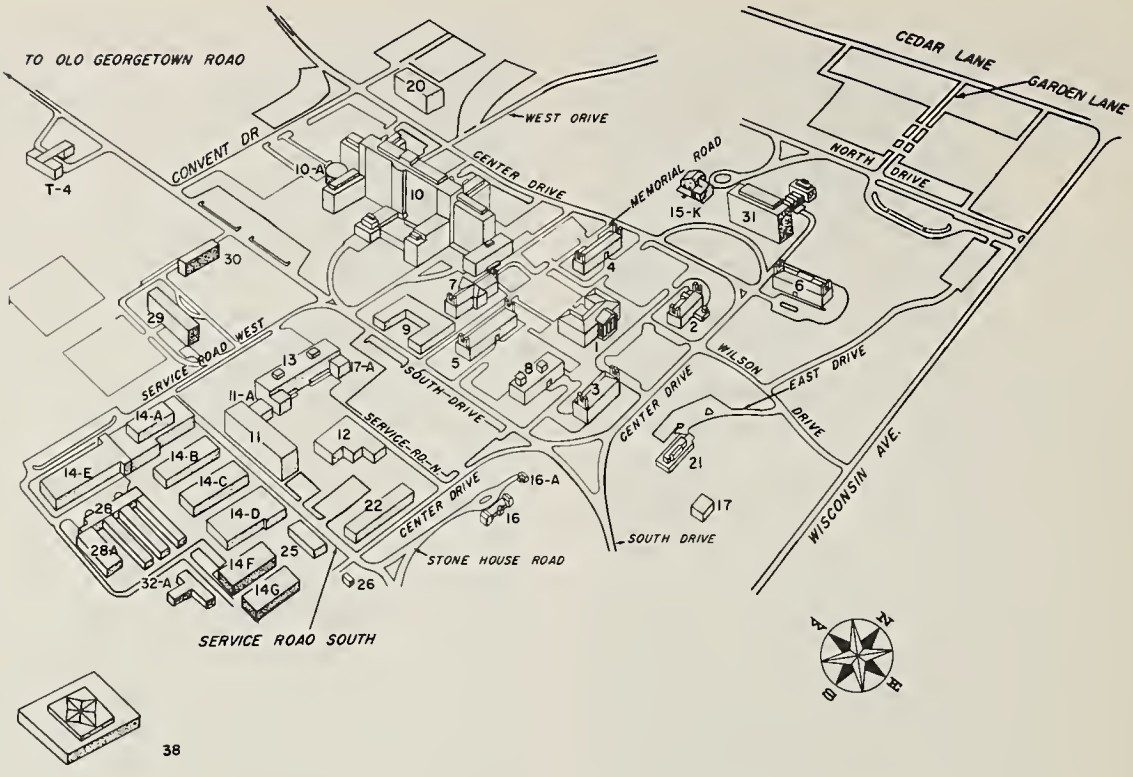
Inside NIH
SCIENCE SEEKS CAUSES

Directory of Buildings



1 Administration
2 National Institute of Arthritis and Metabolic Diseases
3 National Heart Institute; National Institute of Arthritis and Metabolic Diseases
4 National Institute of Arthritis and Metabolic Diseases
5 National Institute of Allergy and Infectious Diseases
6 National Cancer Institute
7 National Institute of Allergy and Infectious Diseases
8 Laboratory Aids Branch; National Cancer Institute; National Institute of Allergy and Infectious Diseases; National Institute of Neurological Diseases and Blindness
9 National Institute of Mental Health; National Institute of Neurological Diseases and Blindness
10 Clinical Center
10A Surgical Wing—New Construction
11 Boiler Plant
11A Incinerator Building
12 Computation and Data Processing Branch; Fire House; Garage; Division of Biologics Standards; Environmental Services Branch
13 Shops; Laundry and Storage Building; Purchasing Section; Division of Research Grants; Financial Management Branch; Property Utilization; Research Facilities Planning Branch
14A, B, C, D, E, F, G: Animal and Animal Feed Buildings; Laboratory Aids Branch
15K Wilson House; Civil Service Commission
16 Stone House; Plant Safety Branch; Interdepartmental Committee on Nutrition for National Defense; Conference Rooms
16A Plant Safety Branch
17 Electrical Power Vault
17A Electrical Power Plant
20 Apartment Building
21 Isotope Laboratory
22 Grounds Maintenance Building; Transportation
25 Chemical Storage
26 Chemical Disposal
28 Dog Kennels; Animal Hospital
28A Laboratory Aids Branch; Comparative Pathology Section
29 Division of Biologics Standards Buildings
30 National Institute of Dental Research Building; National Institute of Neurological Diseases and Blindness
31 General Office Building
32A Greenhouse; National Institute of Mental Health
T–4 Child Research Branch (Mental Health)
38 National Library of Medicine

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